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ANDREW D. FORTNEY, PH.D.

ALEC B. PLUMB\*

\*REGISTERED PATENT AGENT

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FAX: 1 (571) 273-8300

DATE: 12-12-2005

TIME: 8:00 PM

- ☐ WITH CONFIRMATION  
☒ WITHOUT CONFIRMATION

RE: APPLICATION NO. 10/749,876

FILED: 12-31-2003

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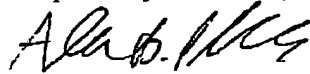
By: \_\_\_\_\_

Jennie Heaton

SUBMITTED HERewith FOR THE ABOVE-CAPTIONED APPLICATION:

- Transmittal Form
- Petition to Withdraw Restriction Requirement (7 Pgs.)
- Exhibit A (Copy of Restriction Requirement dated April 20, 2005)
- Exhibit B (Copy of Amendment & Restriction Response filed on May 18, 2005)
- Exhibit C (Copy of Amendment to the Claims, 20 Pgs.)

Respectfully submitted,



Alec B. Plumb; Reg. No. 56,433

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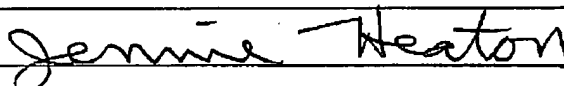
<b>TRANSMITTAL FORM</b>  (to be used for all correspondence after initial filing)	Application Number	10/749,876	
	Filing Date	12-31-2003	
	First Named Inventor	Gudeman et al.	
	Art Unit	1752	
	Examiner Name	Walke, Amanda C.	
Total Number of Pages in This Submission	81	Attorney Docket Number	KOV-012

ENCLOSURES (Check all that apply)		
<input type="checkbox"/> Fee Transmittal Form <input type="checkbox"/> Fee Attached <input type="checkbox"/> Amendment/Reply <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Extension of Time Request <input type="checkbox"/> Express Abandonment Request <input type="checkbox"/> Information Disclosure Statement  <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Reply to Missing Parts/Incomplete Application <input type="checkbox"/> Reply to Missing Parts under 37 CFR 1.52 or 1.53	<input type="checkbox"/> Drawing(s) <input type="checkbox"/> Licensing-related Papers <input checked="" type="checkbox"/> Petition <input type="checkbox"/> Petition to Convert to a Provisional Application <input type="checkbox"/> Power of Attorney, Revocation <input type="checkbox"/> Change of Correspondence Address <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, Number of CD(s) _____ <input type="checkbox"/> Landscape Table on CD	<input type="checkbox"/> After Allowance Communication to TC <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief) <input type="checkbox"/> Proprietary Information <input type="checkbox"/> Status Letter <input checked="" type="checkbox"/> Other Enclosure(s) (please identify below): - Fax Transmission Cover Page - Exhibit A - Exhibit B - Exhibit C
Remarks		

## SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	The Law Offices of Andrew D. Fortney, Ph.D., P.C.		
Signature			
Printed name	Alec B. Plumb		
Date	12-12-2005	Reg. No.	56,433

## CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below:			
Signature			
Typed or printed name	Jennie Heaton	Date	12-12-2005

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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DEC 12 2005

Atty. Docket No. KOV-012

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF:

Christopher GUDEMAN et al.

APPLICATION NO: 10/749,876

FILED: DECEMBER 31, 2003

FOR: RADIATION PATTERNABLE  
FUNCTIONAL MATERIALS,  
METHODS OF THEIR USE, AND  
STRUCTURES FORMED  
THEREFROM

:

: GROUP ART UNIT: 1752

:

: EXAMINER: WALKE, Amanda C.

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By:   
Jennie HeatonPETITION TO WITHDRAW RESTRICTION REQUIREMENT UNDER 37 C.F.R.1.181

Mail Stop PETITION  
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ALEXANDRIA, VA 22313-1450

SIR:

In the interests of justice, Applicant's undersigned representative respectfully requests withdrawal of the Restriction Requirement dated April 20, 2005 in the above-identified application. Additional facts are as follows:

1. On April 20, 2005, restriction was required in the above-identified application as follows:

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Group I: Claims 1-20, drawn to a radiation patternable functional material;

Group II: Claims 21-37, drawn to a compound;

Group III: Claims 38-63, drawn to a radiation definable ink;

Group IV: Claims 64-73, drawn to a method of making a radiation patternable functional material;

Group V: Claims 74-91, drawn to a method of making a compound;

Group VI: Claims 92-112, drawn to a method of making an electronically functional thin film; and

Group VII: Claims 113-123, drawn to a thin film structure.

2. A copy of the Restriction Requirement dated April 20, 2005 is attached as Exhibit A.

3. On May 18, 2005, Applicants elected, with traverse, Group I, Claims 1-20, drawn to a radiation patternable functional material. At the same time, Applicants canceled Claims 113-123, the claims of Group VII.

4. A copy of Applicants' Restriction Response dated May 18, 2005 is attached as Exhibit B.

5. In the Amendment filed concurrently herewith in the above-identified application, Applicants have amended the claims so that every pending claim depends, directly or indirectly, from Claim 1. A copy of the claims as amended by the Amendment filed concurrently herewith is attached to this Petition as Exhibit C.

6. M.P.E.P. § 803 states that restriction is proper only when the groups of claims are (A) independent or distinct as claimed, and (B) there is a serious burden on the Examiner, and that Examiners must provide reasons and/or examples in support of their conclusions.

7. M.P.E.P. § 802.01 states that claims are independent when there is no disclosed relationship between them; for example, a process and an apparatus that is *incapable* of being

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used in practicing the process (emphasis added). M.P.E.P. § 802.01 further states that claims are distinct when they are related as disclosed, but are capable of separate manufacture, use or sale as claimed, AND ARE PATENTABLE (novel and unobvious) OVER EACH OTHER (emphasis in original).

8. By virtue of every claim in the above-identified application depending directly or indirectly from Claim 1, there are no claims in the above-identified application that can be independent from the other claims, as that term is defined by M.P.E.P. § 802.01.

9. In the restriction requirement dated April 20, 2005, the relationship between many of the groups was mischaracterized (e.g., Groups I and II, Groups I and III, Groups I and IV, Groups I and V, Groups I and VI, Groups II and III, Groups II and IV, Groups II and VI, Groups III and IV, Groups III and V, Groups IV and V, Groups IV and VI, Groups V and VI).

10. For example, in the restriction requirement dated April 20, 2005, the claims of Groups I and II were considered unrelated, because the compound was not believed to be required to be employed in a radiation sensitive material, and the radiation sensitive material was not believed to require the specifically claimed compound.

11. However, Claim 1 (Group I) is drawn to a radiation patternable functional material, comprising ligands containing a photoreactive group or a group that is reactive with a photochemically generated species and that, after first-order photoreaction or reacting with said photochemically generated species, materially changes the solubility characteristics of said material in a developer. Furthermore, Claim 21 (Group II) is not only drawn to a compound containing a group that is photoreactive or that is reactive with a photochemically generated species and which, after first-order photoreaction or reacting with said photochemically generated species, materially changes the solubility characteristics of said compound in a developer, but it also depends from Claim 1.

12. Thus, the claims of Group II are related to the claims of Group I.

13. In addition, the restriction requirement dated April 20, 2005 states that Groups I and III are distinct because, in the Examiner's opinion, the ink could be made employing a

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different photosensitive material and/or the material of Group I is not required to be employed in an ink.

14. However, Claim 38 (Group III) is (and always has been) drawn to a radiation definable ink, comprising the material of Claim 1 (Group I). Based on the language of claim 38, it is not known how the ink of Group III could be made employing a photosensitive material other than the material of Claim 1 (Group I).

15. Furthermore, it is not known how the ink of Group III could be capable of separate manufacture, use or sale from the material of Claim 1, as the ink of Group III is required to include the material of Claim 1.

16. Thus, the relationship between Groups I and III was mischaracterized in the restriction requirement dated April 20, 2005.

17. The restriction requirement dated April 20, 2005 states that Groups I and IV are distinct, because the process (of Group IV) is generic and could be employed to prepare many other materials having different compositions than that of Group I.

18. However, Claim 64 (Group IV) is drawn to a "method of making the material of Claim 1" (Group I). Based on the language of Claim 64, it is not known how the method of Group IV could be used to make a material having a composition that differs from that of Claim 1 (Group I).

19. Thus, the claims of Group IV are related to the claims of Group I.

20. The restriction requirement dated April 20, 2005 states that Groups I and V are unrelated because, in the Examiner's opinion, the groups are quite different and there is no relation between the radiation sensitive material of Group I and the method of making a compound of Group V.

21. In this case, the conclusion of unrelatedness has been merely restated as a reason and/or example in support of finding the same.

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22. In addition, Claim 74 (Group V) is drawn to a "method of making the compound of Claim 21" (Group II). As explained above, Claim 21 (Group II) is not only drawn to a compound containing a group that is photoreactive or that is reactive with a photochemically generated species and which, after first-order photoreaction or reacting with said photochemically generated species, materially changes the solubility characteristics of said compound in a developer, Claim 21 also depends from Claim 1 (Group I).

23. Thus, the claims of Group V are related to the claims of Group I.

24. The restriction requirement dated April 20, 2005 states that Groups I and VI are unrelated, because the material may be coated onto a substrate and used to form a pattern in and of itself.

25. However, Claim 92 (Group VI) is drawn to a method of making an electronically functional thin film, comprising irradiating the ink of Claim 38 (Group III). As explained above, Claim 38 is drawn to a radiation definable ink, comprising the material of Claim 1 (Group I). Thus, Claim 92 depends indirectly from Claim 1.

26. Thus, the claims of Group VI are related to the claims of Group I.

27. The restriction requirement dated April 20, 2005 states that Groups II and III are unrelated because, in the Examiner's opinion, the groups are drawn to two distinct inventions, the compound of Group II is not required to be used in the [printing] ink, nor does the [printing] ink (presumably of Group III) require the use of the compound.

28. However, Claim 38 (Group III) is drawn to a radiation definable ink (rather than a printing ink), comprising the material of Claim 1 (Group I). As explained above, Claim 21 (Group II) also depends from Claim 1 (Group I).

29. Thus, the claims of Group III are related to the claims of Group II.

30. Furthermore, by the principle of claim differentiation, the limitations of one dependent claim are not necessarily required to be used in another dependent claim, and vice versa.

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31. If the reasons and/or examples set forth in the restriction requirement dated April 20, 2005 in support of restriction between Groups II and III are plausible and/or legally sufficient, then the USPTO can require restriction between any two claims that depend from the same independent claim. However, the USPTO frequently issues patents containing such dependent claims. Applicants' undersigned representative estimates that millions of such patents have issued from the USPTO since the origination of dependent claims.

32. Thus, restriction between the claims of Groups II and III is improper, and should be withdrawn.

33. Furthermore, largely for the reasons discussed above with regard to Groups I and II, Groups I and III, Groups I and IV, Groups I and V, Groups I and VI, and Groups II and III, the reasons and/or examples provided in the Restriction Requirement dated April 20, 2005 in support of the conclusions of unrelatedness between Groups II and IV, Groups II and V, Groups II and VI, Groups III and IV, Groups III and V, Groups III and VI, Groups IV and V, Groups IV and VI, and Groups V and VI are technically and factually inaccurate, and/or logically and legally inadequate.

34. In the interest of saving the Office's time, Applicants' undersigned representative wishes to state simply that all claims in the present application depend directly or indirectly from Claim 1, and therefore, the various Groups of claims in this application cannot be independent from one another. Applicants' undersigned representative wishes to refer the Office of Petitions to the Restriction Response filed on May 18, 2005 for detailed explanations as to why the reasons and/or examples provided in the Restriction Requirement dated April 20, 2005 in support of the conclusions of unrelatedness between Groups II and IV, Groups II and V, Groups II and VI, Groups III and IV, Groups III and V, Groups III and VI, Groups IV and V, Groups IV and VI, and Groups V and VI are technically and factually inaccurate, and/or logically and legally inadequate.

35. Fees under 37 C.F.R. 1.17(m) for filing this Petition, under 37 C.F.R. 1.18(a) for the Issue Fee, and under 37 C.F.R. 1.18(d) for the Publication Fee are submitted herewith.



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36. Consequently, in the interest of justice, Applicant's undersigned representative respectfully requests withdrawal of restriction requirement in the above-identified application as to Groups I-VI, identified in paragraph 1 above.

37. Additional facts in support of this Petition may be provided on request.

38. Further, Petitioner sayeth not.

Early notice of any decision by the U.S. Patent and Trademark Office to grant the relief requested in paragraph 12 above is respectfully requested.

Respectfully submitted,

THE LAW OFFICES OF ANDREW D. FORTNEY, PH.D., P.C.  
Customer No. 36872

/Andrew D. Fortney/s

Andrew D. Fortney, Ph.D.  
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## EXHIBIT A



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/749,876	12/31/2003	Christopher Gudeman	KOV-012	6305
36872	7590	04/20/2005	EXAMINER	
THE LAW OFFICES OF ANDREW D. FORTNEY, PH.D., P.C. 7257 N. MAPLE AVENUE BLDG. D, 3107 FRESNO, CA 93720			WALKE, AMANDA C	
			ART UNIT	PAPER NUMBER
			1752	

DATE MAILED: 04/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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APR 25 2005

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<b>Office Action Summary</b>	Application No. 10/749,876	Applicant(s) GUDEMAN ET AL.	
	Examiner Amanda C. Walke	Art Unit 1752	

— The MAILING DATE of this communication appears on the cover sheet with the correspondence address —  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 1 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 15 April 2004.
- 2a) ☐ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-123 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) \_\_\_\_\_ is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 1-123 are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

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### DETAILED ACTION

#### *Election/Restrictions*

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
  - I. Claims 1-20, drawn to a radiation patternable functional material, classified in class 430, subclass 270.1.
  - II. Claims 21-37, drawn to a compound, classified in class 423, subclass 324.
  - III. Claims 38-63, drawn to a radiation definable ink, classified in class 106, subclass 31.13.
  - IV. Claims 64-73, drawn to a method of making a radiation patternable functional material, classified in class 523, subclass 200.
  - V. Claims 74-91, drawn to a method of making a compound, classified in class 423, subclass 348.
  - VI. Claims 92-112, drawn to a method of making an electronically functional thin film, classified in class 347, subclass 102.
  - VII. Claims 113-123, drawn to a thin film structure, classified in class 257, subclass 1.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions are unrelated as the compound is not required to be employed in a radiation sensitive material, and the radiation sensitive material does not require the specifically claimed compound.

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3. Inventions I and III are related as product and process of use. The inventions can be shown to be distinct if either or both of the following can be shown: (1) the process for using the product as claimed can be practiced with another materially different product or (2) the product as claimed can be used in a materially different process of using that product (MPEP § 806.05(h)). In the instant case the ink could be made employing a different photosensitive material and/or the material of group I is not required to be employed in an ink. The material could be coated onto a substrate and used to form a pattern in and of itself.

4. Inventions I and IV are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the process is generic and could be employed to prepare many other material having different compositions than that of group I.

5. Inventions I and V are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions are quite different. There is no relation between the radiation sensitive material of group I and the method of making a compound of group V.

6. Inventions I and VI are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions are quite different. The material of group I is not related to the method of making a thin

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film employing a printing ink, as the material may be coated onto a substrate and used to form a pattern in and of itself.

7. Inventions I and VII are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions are drawn to two distinct inventions. The photosensitive material of group I is unrelated to the thin film device (a finished product from *any* photodefinable material).

8. Inventions II and III are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions are drawn to two distinct inventions. The compound of group II is not required to be used in the printing ink, nor does the printing ink require the use of the compound.

9. Inventions II and IV are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions are drawn to two distinct inventions. The compound of group II is not required to be used in any photosensitive material, nor does the method of making the material require the use of that specific compound.

10. Inventions II and V are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the

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compound may be made employing a different process and the process may be employed to prepare a different product.

11. Inventions II and VI are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions are drawn to two distinct inventions. The compound is not required to be employed in any process of making a thick film, nor does the process require the compound of group II.

12. Inventions II and VII are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions are drawn to two distinct inventions. The compound of group II is unrelated to the thin film device (a finished product from *any* photodefinable material).

13. Inventions III and IV are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions are drawn to two distinct inventions. The ink is unrelated to the method of preparing a photosensitive material of group IV.

14. Inventions III and V are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different



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inventions are drawn to two distinct inventions. The ink is unrelated to the method of preparing the compound of group V.

15. Inventions III and VI are related as product and process of use. The inventions can be shown to be distinct if either or both of the following can be shown: (1) the process for using the product as claimed can be practiced with another materially different product or (2) the product as claimed can be used in a materially different process of using that product (MPEP § 806.05(h)). In the instant case the ink of group III is not required to be employed in the method of group VI, nor does the method of group VI require the use of that photosensitive ink.

16. Inventions III and VII are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions are drawn to two distinct inventions. The ink of group III is unrelated to the thin film device (a finished product from *any* photodefinable material).

17. Inventions IV and V are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions are drawn to two distinct inventions. The method of making a photosensitive material is completely unrelated to the method of making a compound of group V.

18. Inventions IV and VI are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different

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inventions are drawn to two distinct inventions. The method of making a photosensitive material is completely unrelated to the method of making a film of group VI.

19. Inventions IV and VII are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions are drawn to two distinct inventions. The method of making a photosensitive material is completely unrelated to the thin film device (a finished product from *any* photodefinable material).

20. Inventions V and VI are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions are drawn to two distinct inventions. The method of making the compound of group V is unrelated to the method of making the thin film device of group VI.

21. Inventions V and VII are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions are drawn to two distinct inventions. The method of making a compound is completely unrelated to the thin film device (a finished product from *any* photodefinable material).

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22. Inventions VI and VII are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the method of making a device could be employed to prepare a different finished product than that of group VII, and the product could be prepared using a different process and different materials.

23. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Amanda C. Walke whose telephone number is 571-272-1337. The examiner can normally be reached on M-R 5:30-4.

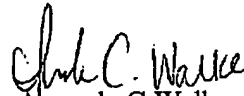
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia Kelly can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Amanda C Walke  
Examiner  
Art Unit 1752

ACW

April 17, 2005

## EXHIBIT B

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Atty. Docket No. KOV-012

DEC 12 2005

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF:

:

Christopher GUDEMAN et al.

: GROUP ART UNIT: 1752

APPLICATION NO: 10/749,876

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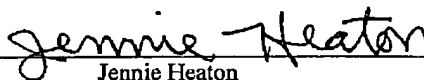
FILED: DECEMBER 31, 2003

: EXAMINER: WALKE, Amanda C.

FOR: RADIATION PATTERNABLE FUNCTIONAL MATERIALS, METHODS OF  
THEIR USE, AND STRUCTURES FORMED THEREFROM

I hereby certify that this document is being facsimile transmitted to the USPTO or deposited with the United States Postal Service as first class mail in an envelope addressed to Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on May 19, 2005.

By:

  
Jennie Heaton

AMENDMENT AND RESPONSE TO RESTRICTION REQUIREMENT  
UNDER 35 U.S.C. 121 AND 37 C.F.R. 1.115 AND 1.143

MAIL STOP AMENDMENT  
COMMISSIONER FOR PATENTS  
P.O. BOX 1450  
ALEXANDRIA, VA 22313-1450

SIR:

Responsive to the Office Action and Requirement for Restriction dated December 15, 2004, Applicants elect, with traverse, Group I, Claims 1-20, drawn to a radiation patternable functional material, and respectfully request entry of the following amendments and consideration of the following remarks.

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Amendments to the Claims

Please cancel Claims 113-123. The entire list of claims in the present application is now as follows:

1. (Original) A radiation patternable functional material, comprising:
  - a) nanoparticles of an electronically functional substance; and
  - b) a plurality of ligands bound to each of said nanoparticles, said ligands containing a photoreactive group or a group that is reactive with a photochemically generated species and that, after first-order photoreaction or reacting with said photochemically generated species, materially changes the solubility characteristics of said material in a developer.
2. (Original) The material of Claim 1, wherein said electronically functional substance comprises a member of the group consisting of semiconductors, metals, dielectrics and phosphors.
3. (Original) The material of Claim 2, wherein said electronically functional substance comprises a member of the group consisting of semiconductors and metals.
4. (Original) The material of Claim 3, wherein said electronically functional substance comprises one or more members of the group consisting of silicon, germanium, CdS, CdSe, InP, InAs and GaAs.
5. (Original) The material of Claim 4, wherein said electronically functional substance comprises silicon.
6. (Original) The material of Claim 3, wherein said electronically functional substance comprises one or more members of the group consisting of transition metals, noble metals, aluminum, indium, tin, lead, and alloys thereof.

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7. (Original) The material of Claim 6, wherein said electronically functional substance comprises one or more members of the group consisting of Cr, Mo, W, Fe, Ru, Ni, Pd, Pt, copper, silver, gold, and aluminum.
8. (Original) The material of Claim 7, wherein said electronically functional substance comprises nickel, copper, silver or gold.
9. (Original) The material of Claim 2, wherein said electronically functional substance comprises an oxide, nitride, oxynitride, carbide or sulfide of a metal or metalloid.
10. (Original) The material of Claim 1, wherein said ligands contain a group that is reactive with said photochemically generated species and that, after reacting with said photochemically generated species, materially changes the solubility characteristics of said material in said developer.
11. (Original) The material of Claim 10, wherein said photoreactive group comprises a quinone, and said ligand comprises a phenol.
12. (Original) The material of Claim 1, wherein said ligands are bound to said nanoparticles by covalent, coordination and/or ionic bonds.
13. (Original) The material of Claim 12, wherein said ligands are bound to said nanoparticles through at least one nanoparticle-binding member selected from the group consisting of an alcoholate, a thiolate, a disulfide, a carboxylate, a carboxylic acid, an amine, a phosphine, a phosphine oxide and an alkyl group.



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14. (Original) The material of Claim 1, wherein said group that is reactive with said photochemically generated species is selected from the group consisting of a carbon-carbon double bond, an epoxide, an oxirane, an aziridine, a phenol, a carbonate and a carbamate.
15. (Original) The material of Claim 14, wherein said group that is reactive with said photochemically generated species comprises said carbon-carbon double bond, and said carbon-carbon double bond is selected from the group consisting of a vinyl group, an activated carbon-carbon double bond, an acrylate, and a vinyl ketone.
16. (Original) The material of Claim 1, wherein said nanoparticles have an average diameter of less than 100 nm.
17. (Original) The material of Claim 1, wherein said nanoparticles have an average diameter of less than 10 nm.
18. (Original) The material of Claim 1, wherein said nanoparticles have an average diameter of less than 5 nm.
19. (Original) The material of Claim 1, wherein said photochemically generated species has an ultraviolet absorption maximum at a first wavelength and said nanoparticles have an ultraviolet absorption maximum at a second wavelength, said second wavelength significantly differing from said first wavelength.
20. (Original) The material of Claim 19, wherein said photoreactive group comprises an azide, said first wavelength is one at which a mercury arc lamp has a relatively strong irradiance, and said nanoparticles comprise a metal having a relatively poor absorbance at said first wavelength.

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21. (Original) A compound of the formula (1):



where NP comprises a nanoparticle of an electronically functional substance; Y is a group that is photoreactive or that is reactive with a photochemically generated species and which, after first-order photoreaction or reacting with said photochemically generated species, materially changes the solubility characteristics of said compound in a developer;  $X^1$  and  $X^2$  are independently a nanoparticle-binding group;  $R^1$  is a monovalent group that is not reactive with said photochemically generated species;  $R^2$  is a divalent bridging group; m is at least 0, and the m instances of  $R^1-X^1$  may be the same or different; and n is at least 1, and the n instances of  $X^2-R^2-Y$  may be the same or different.

22. (Original) The compound of Claim 21, wherein said electronically functional substance comprises a member of the group consisting of semiconductors and metals.
23. (Original) The compound of Claim 22, wherein said electronically functional substance consists essentially of silicon and/or germanium.
24. (Original) The compound of Claim 22, wherein said electronically functional substance comprises one or more members of the group consisting of transition metals, noble metals, aluminum, indium, tin, lead, and alloys thereof.
25. (Original) The compound of Claim 24, wherein said electronically functional substance consists essentially of nickel, copper, silver or gold.
26. (Original) The compound of Claim 22, wherein said electronically functional substance comprises an oxide, nitride, oxynitride, carbide or sulfide of a metal or metalloid.

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27. (Original) The compound of Claim 21, wherein  $R^1$  is alkyl, cycloalkyl, aryl or aralkyl, any one of which may be substituted one or more times with a halogen or with a substituent selected from the group consisting of alkyl (except where  $R^1 = \text{alkyl}$ ), cycloalkyl, aryl, aralkyl (except where  $R^1 = \text{alkyl}$ ), alkoxy, alkylthio, alkylcarbonyl, alkoxycarbonyl, alkylcarboxy, alkylamino, dialkylamino, alkylamido, dialkylamido, cycloalkoxy, cycloalkylthio, cycloalkylcarbonyl, cycloalkoxycarbonyl, cycloalkylcarboxy, cycloalkylamino, di(cycloalkyl)amino, (cycloalkyl)(alkyl)amino, cycloalkylamido, di(cycloalkyl)amido, (cycloalkyl)(alkyl)amido, aryloxy, arylthio, arylcarbonyl, aryloxycarbonyl, arylcarboxy, arylamino, diarylamino, (aryl)(alkyl)amino, arylamido, aralkoxy, aralkylthio, aralkylcarbonyl, aralkoxycarbonyl, aralkylcarboxy, aralkylamino, diaralkylamino, (aralkyl)(alkyl)amino, heterocyclyl, trialkylsilyl, and trialkylsilyloxy, each of which may be further substituted with one or more halogens, alkyl groups (except for alkyl substituents on  $R^1$ ) and/or alkoxy groups.
28. (Original) The compound of Claim 27, wherein  $R^1$  is  $C_4$ - $C_{20}$  alkyl which may be substituted one or more times with a halogen, a  $C_1$ - $C_6$  alkoxy,  $C_3$ - $C_8$  cycloalkyl, phenyl and/or  $C_7$ - $C_{20}$  aralkyl, each of which (except for halogen) may be further substituted with one or more halogens,  $C_1$ - $C_6$  alkyl groups and/or  $C_1$ - $C_6$  alkoxy groups.
29. (Original) The compound of Claim 21, wherein  $R^2$  is selected from the group consisting of alkylene, alkyleneoxy, alkyleneoxyalkylene, alkyleneoxyalkyleneoxy, alkyleneethio, alkyleneethioalkylene, alkyleneecarbonyl, alkyleneoxycarbonyl, alkyleneecarboxy, alkyleneamino, alkylene(alkyl)amino, alkylene(alkyl)aminoalkylene, alkyleneamido, alkylene(alkyl)amido, cycloalkylene, cycloalkyleneoxy, cycloalkyleneethio, cycloalkyleneecarbonyl, cycloalkyleneoxycarbonyl, cycloalkyleneecarboxy, cycloalkyleneamino, (cycloalkylene)(alkyl)amino, cycloalkyleneamido, (cycloalkylene)(alkyl)amido, arylene, alkylene-arylene, alkylene-arylene-alkylene, aryleneoxy, alkyleneoxyarylene, alkylene-aryleneoxy, aryleneoxyalkylene, aryleneethio, alkylene-aryleneethio,

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arylenethioalkylene, arylenecarbonyl, alkylene-arylenecarbonyl, aryleneoxy carbonyl, alkylene-aryleneoxy carbonyl, arylenecarboxy, alkylene-arylenecarboxy, aryleneamino, alkylene-aryleneamino, arylene(aryl)-amino, alkylene-arylene(aryl)amino, arylene(alkyl)amino, alkylene-arylene(alkyl)amino, alkylene(aryl)amino, aryleneamido, aralkylene, aralkyleneoxy, (alkylene)aralkyleneoxy, aralkylenethio, aralkylenecarbonyl, aralkyleneoxy carbonyl, aralkylenecarboxy, aralkyleneamino, aralkylene(aryl)amino, (aralkylene)(alkyl)amino, (alkylene)(aralkyl)amino, heterocyclylene, alkylene-heterocyclylene, and alkylene-heterocyclylene-alkylene, each of which may be further substituted with one or more halogens, alkyl groups (except where  $R^2$  = alkylene), alkoxy groups, trialkylsilyl, and/or trialkylsilyloxy groups.

30. (Original) The compound of Claim 29, wherein  $R^2$  is selected from the group consisting of alkylene, alkylene substituted with one or more halogens and/or alkoxy groups, alkyleneoxy, alkyleneoxyalkylene, alkyleneoxyalkyleneoxy, alkylene(alkyl)amino, cycloalkylene, arylene, arylene substituted with one or more halogens, alkyl groups and/or alkoxy groups, aryleneoxy, arylenethio, arylene(alkyl)amino, aralkylene, (alkylene)aralkylene, and aralkylene(alkyl)amino.
31. (Original) The compound of Claim 30, wherein  $R^2$  is selected from the group consisting of  $C_4$ - $C_{20}$ , branched or unbranched, saturated or unsaturated alkylene groups;  $C_7$ - $C_{17}$ , branched or unbranched, substituted or unsubstituted aralkylene groups;  $C_4$ - $C_{20}$ , branched or unbranched, saturated or unsaturated alkyleneoxy groups; and  $C_4$ - $C_{20}$ , branched or unbranched, saturated or unsaturated alkylene thio groups.
32. (Original) The compound of Claim 21, wherein Y is reactive with a photochemically generated species and which, after reacting with said photochemically generated species, materially changes the solubility characteristics of said material in said developer.

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33. (Original) The compound of Claim 32, wherein Y is selected from the group consisting of a carbon-carbon double bond, an epoxide, an oxirane, an aziridine, and a phenol.
34. (Original) The compound of Claim 32, wherein Y is selected from the group consisting of a vinyl group, a vinylidene group, an epoxide, a carbonate, a carbamate and a phenol.
35. (Original) The compound of Claim 34, wherein Y comprises a vinyl group or a vinylidene group substituted with a halogen, a C<sub>1</sub>-C<sub>6</sub> alkyl group, a C<sub>1</sub>-C<sub>6</sub> alkoxy group, a phenyl group, a phenyl group substituted with one or more halogens, C<sub>1</sub>-C<sub>6</sub> alkyl groups, C<sub>1</sub>-C<sub>6</sub> alkoxy groups and/or di-(C<sub>1</sub>-C<sub>6</sub> alkyl)amino groups, a -C(=O)-C<sub>1</sub>-C<sub>6</sub> alkyl group, a -C(=O)-C<sub>1</sub>-C<sub>6</sub> alkoxy group, or a cyano group.
36. (Original) The compound of Claim 21, wherein X<sup>1</sup> and X<sup>2</sup> are independently a chalcogen, a carboxylate group, a carboxylic acid group, a thiocarboxylate group, a thiocarboxylic acid group, an alkylene group, NR<sup>5</sup><sub>u</sub> (where u is from 0 to 2 and each R<sup>5</sup> is independently H or a C<sub>1</sub>-C<sub>6</sub> alkyl group), S(O)<sub>x</sub> (where x is from 1 to 3), PR<sup>7</sup><sub>v</sub> (where v is from 0 to 3 and each R<sup>7</sup> is independently H, a C<sub>1</sub>-C<sub>6</sub> alkyl group or a C<sub>6</sub>-C<sub>10</sub> aryl group which may be substituted with one or more halogen, C<sub>1</sub>-C<sub>4</sub> alkyl, C<sub>1</sub>-C<sub>4</sub> alkoxy, or di-C<sub>1</sub>-C<sub>4</sub> alkylamino groups) or P(O)<sub>y</sub>(R<sup>6</sup>)<sub>z</sub> (where y is from 1 to 3, z is 1 or 2, and each R<sup>6</sup> is independently H, phenyl or a C<sub>1</sub>-C<sub>6</sub> alkyl group).
37. (Original) The compound of Claim 36, wherein X<sup>1</sup> and X<sup>2</sup> are independently at least one nanoparticle-binding member is selected from the group consisting of O, S, a carboxylate, a carboxylic acid group, and a -CH<sub>2</sub>CH<sub>2</sub>- group.
38. (Original) A radiation definable ink, comprising:
- a) the material of Claim 1; and
  - b) a solvent in which said material is soluble.

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39. (Original) The ink of Claim 38, further comprising a source of said photochemically generated species.
40. (Original) The ink of Claim 39, wherein said source of said photochemically generated species is selected from the group consisting of azides, photogenerated acid sources, photogenerated radical sources, carbonates, carbamates, and quinones.
41. (Original) The ink of Claim 39, wherein said source of said photochemically generated species is an azide, and said group that is reactive with said photochemically generated species comprises said carbon-carbon double bond.
42. (Original) The ink of Claim 39, wherein said source of said photochemically generated species is a photogenerated acid source, and said group that is reactive with said photochemically generated species is selected from the group consisting of an epoxide, an oxirane, an aziridine, and an activated carbon-carbon double bond.
43. (Original) The ink of Claim 39, wherein said source of said photochemically generated species is a photogenerated radical source, and said group that is reactive with said photochemically generated species comprises an acrylate.
44. (Original) The ink of Claim 38, wherein said ligands contain said photochemically reactive group, and said photochemically reactive group comprises a carbonate and/or a carbamate.
45. (Original) The ink of Claim 38, wherein said photoreactive group comprises a quinone, and said ligand comprises a phenol.

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46. (Original) The ink of Claim 38, wherein said material is present in said ink in a percentage by weight of from 0.1% to 50%.
47. (Original) The ink of Claim 38, wherein said solvent is selected from the group consisting of alkanes, alkenes, halogenated alkanes, halogenated alkenes, arenes, substituted arenes, alcohols, ethers, cyclic ethers, aliphatic ketones, aliphatic esters, aliphatic amides and aliphatic sulfoxides.
48. (Original) The ink of Claim 47, wherein said solvent is selected from the group consisting of C<sub>6</sub>-C<sub>20</sub> alkanes, C<sub>6</sub>-C<sub>20</sub> alkenes, benzene which may be substituted with from 1 to 3 C<sub>1</sub>-C<sub>4</sub> alkyl groups, C<sub>1</sub>-C<sub>6</sub> aliphatic alcohols, C<sub>4</sub>-C<sub>20</sub> ethers, C<sub>4</sub>-C<sub>20</sub> polyethers, C<sub>4</sub>-C<sub>10</sub> aliphatic ketones, and C<sub>1</sub>-C<sub>6</sub> aliphatic esters of C<sub>2</sub>-C<sub>12</sub> aliphatic carboxylic acids that may be substituted with from 1 to 3 halogen atoms or a C<sub>1</sub>-C<sub>4</sub> alkoxy group.
49. (Original) The ink of Claim 48, wherein said solvent comprises propylene glycol methyl ether acetate or ethyl ethoxypropionate.
50. (Original) The ink of Claim 47, further comprising one or more additives selected from the group consisting of a tension reducing agent, a surfactant, a thickening agent, and an adhesion promoter.
51. (Original) The ink of Claim 50, further comprising said adhesion promoter.
52. (Original) The ink of Claim 51, wherein said adhesion promoter comprises a C<sub>6</sub>-C<sub>20</sub>, branched or unbranched, mono- or polyunsaturated alkene; a C<sub>8</sub>-C<sub>18</sub>, branched or unbranched, substituted or unsubstituted mono- or polyunsaturated alkene; a C<sub>4</sub>-C<sub>20</sub>, branched or unbranched, mono- or polyunsaturated alkenoic acid; a C<sub>1</sub>-C<sub>20</sub> branched or

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unbranched aliphatic alcohol ester of a C<sub>2</sub>-C<sub>20</sub>, branched or unbranched aliphatic acid, wherein at least one of said aliphatic alcohol and said aliphatic acid contains at least 3 carbon atoms and at least one site of unsaturation; and/or a C<sub>4</sub>-C<sub>20</sub>, branched or unbranched, mono- or polyunsaturated aliphatic alcohol or aliphatic mercaptan.

53. (Original) A radiation definable ink, comprising:
- a) the compound of Claim 21; and
  - b) a solvent in which said compound is soluble.
54. (Original) The ink of Claim 53, further comprising a source of said photochemically generated species.
55. (Original) The ink of Claim 54, wherein said source of said photochemically generated species is selected from the group consisting of azides, photogenerated acid sources, photogenerated radical sources and quinones.
56. (Original) The ink of Claim 54, wherein said source of said photochemically generated species is an azide, and said group that is reactive with said photochemically generated species comprises said carbon-carbon double bond.
57. (Original) The ink of Claim 54, wherein said source of said photochemically generated species is a photogenerated acid source, and said group that is reactive with said photochemically generated species is selected from the group consisting of an epoxide, an oxirane, an aziridine, and an activated carbon-carbon double bond.
58. (Original) The ink of Claim 54, wherein said source of said photochemically generated species is a photogenerated radical source, and said group that is reactive with said photochemically generated species comprises an acrylate.



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59. (Original) The ink of Claim 53, wherein said ligands contain said photochemically reactive group, and said photochemically reactive group comprises a carbonate and/or a carbamate.
60. (Original) The ink of Claim 53, wherein said compound is present in said composition in a percentage by weight of from 0.1% to 50%.
61. (Original) The ink of Claim 53, further comprising one or more additives selected from the group consisting of a tension reducing agent, a surfactant, a thickening agent, and an adhesion promoter.
62. (Original) The ink of Claim 61, further comprising said adhesion promoter.
63. (Original) The ink of Claim 62, wherein said binder comprises a C<sub>6</sub>-C<sub>20</sub>, branched or unbranched, mono- or polyunsaturated alkene; a C<sub>8</sub>-C<sub>18</sub>, branched or unbranched, substituted or unsubstituted mono- or polyunsaturated aralkene; a C<sub>4</sub>-C<sub>20</sub>, branched or unbranched, mono- or polyunsaturated alkenoic acid; a C<sub>1</sub>-C<sub>20</sub> branched or unbranched aliphatic alcohol ester of a C<sub>2</sub>-C<sub>20</sub>, branched or unbranched aliphatic acid, wherein at least one of said aliphatic alcohol and said aliphatic acid contains at least 3 carbon atoms and at least one site of unsaturation; and/or a C<sub>4</sub>-C<sub>20</sub>, branched or unbranched, mono- or polyunsaturated aliphatic alcohol or aliphatic mercaptan.
64. (Original) A method of making the material of Claim 1, comprising the steps of:
- a) reacting said nanoparticles of an electronically functional substance with one or more non-ligated compounds corresponding to said ligands having said photoreactive group or said group that is reactive with said photochemically generated species; and

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- b) isolating and/or purifying said material.
65. (Original) The method of Claim 64, wherein said nanoparticles of an electronically functional substance contain ligands not having said photoreactive group or said group that is reactive with said photochemically generated species.
66. (Original) The method of Claim 65, wherein said reacting comprises exchanging said non-ligated compounds for said ligands not having said photoreactive group or said group that is reactive with said photochemically generated species on said nanoparticles.
67. (Original) The method of Claim 65, wherein said reacting comprises mixing (1) nanoparticles of an electronically functional substance containing said ligands not having said photoreactive group or said group that is reactive with said photochemically generated species bound thereto and (2) said non-ligated compounds in a solvent for a length of time sufficient to exchange at least a portion of the non-ligated compounds for said ligands not having said photoreactive group or said group that is reactive with said photochemically generated species bound thereto.
68. (Original) The method of Claim 67, wherein said ligands not having said photoreactive group or said group that is reactive with said photochemically generated species bound thereto are present in an excess molar amount with respect to said nanoparticles.
69. (Original) The method of Claim 65, further comprising mixing a Lewis base with said nanoparticles having bound thereto ligands not containing said group that is reactive with said photochemically generated species and said non-ligated compounds to promote a ligand exchange.
70. (Original) A method of making the material of Claim 1,

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- a) mixing (i) said nanoparticles having bound thereto ligands not containing a group that is reactive with said photochemically generated species with (ii) one or more non-ligated compounds corresponding to said ligands containing a group that is reactive with said photochemically generated species, said non-ligated compounds forming a van der Waals complex or micelle with said ligands bound to said nanoparticles and not containing a group that is reactive with said photochemically generated species; and
  - b) isolating and/or purifying said material.
71. (Original) The method of Claim 70, wherein said nanoparticles having bound thereto ligands not containing said group that is reactive with said photochemically generated species comprises (i) a nanoparticle core of said electronically functional substance, and (ii) long-chain alkyl groups covalently bound thereto.
72. (Original) The method of Claim 70, wherein said non-ligated compounds comprise a long-chain alkyl group covalently bound to said group that is reactive with said photochemically generated species.
73. (Original) The method of Claim 70, wherein said mixing step is conducted in a polar solvent.
74. (Original) A method of making the compound of Claim 21, comprising the steps of
- a) mixing nanoparticles of the formula  $NP(X^1-R^1)_k$ , where  $k$  is an integer greater than 1 and where  $NP$ ,  $X^1$  and  $R^1$  are as defined in Claim 21, with a molar excess of a compound of the formula  $HX^2-R^2-Y$  or a salt thereof, where  $X^2$ ,  $R^2$  and  $Y$  are as defined in Claim 21, in a reaction mixture; and
  - b) isolating and/or purifying said compound of the formula (1) from said reaction mixture.

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75. (Original) The method of Claim 74, further comprising mixing a Lewis base with said nanoparticles of the formula  $\text{NP}(\text{X}^1\text{-R}^1)_k$  and said compound of the formula  $\text{HX}^2\text{-R}^2\text{-Y}$  to promote a ligand exchange.
76. (Original) The method of Claim 74, wherein said compound of the formula  $\text{H-X}^2\text{-R}^2\text{-Y}$  or a salt thereof is present in at least 4 times the molar amount of said nanoparticles.
77. (Original) The method of Claim 74, wherein  $\text{R}^1\text{-X}^1$  is  $\text{R}^1\text{-C(=O)-O-}$ , and  $\text{H-X}^2\text{-R}^2\text{-Y}$  is  $\text{H-S-R}^2\text{-Y}$ .
78. (Original) A method of making the compound of Claim 21,  
a) either:  
i) mixing nanoparticles of the formula  $(\text{R}^1\text{-X}^1)_m\text{NP}(\text{X}^2\text{-R}^3\text{-Z})_n$ , where  $\text{R}^3$  is any  $\text{R}^2$  group, Z is a leaving group or electrophile, and NP, m, n,  $\text{X}^1$ ,  $\text{X}^2$ ,  $\text{R}^1$  and  $\text{R}^2$  are as defined in Claim 21, with a compound of the formula  $\text{H-Y}$ ,  $\text{H-Nu-Y}$ ,  $\text{H-Nu-R}^4\text{-Y}$  or a salt of such compounds, where Nu is a conventional nucleophile and  $\text{R}^4$  is  $\text{R}^2$  minus  $\text{R}^3$ , and Y is as defined in Claim 21, in a reaction mixture, or  
ii) mixing nanoparticles of the formula  $(\text{R}^1\text{-X}^1)_m\text{NP}(\text{X}^2\text{-R}^3\text{-Nu-H})_n$  or a salt thereof with a compound of the formula  $\text{Z-Y}$  or  $\text{Z-R}^4\text{-Y}$  in a reaction mixture, where  $\text{R}^1$ ,  $\text{R}^3$ ,  $\text{R}^4$ , NP, m, n,  $\text{X}^1$ ,  $\text{X}^2$ , Nu, Y and Z are as defined above; and  
b) isolating and/or purifying said compound of the formula (1) from said reaction mixture.
79. (Original) The method of Claim 78, wherein said nanoparticles have the formula  $(\text{R}^1\text{-X}^1)_m\text{NP}(\text{X}^2\text{-R}^3\text{-OH})_n$ ,  $(\text{R}^1\text{-X}^1)_m\text{NP}(\text{X}^2\text{-R}^3\text{-COOR}^5)_n$ ,  $(\text{R}^1\text{-X}^1)_m\text{NP}(\text{X}^2\text{-R}^3\text{-NZ}_2)_n$ , or  $(\text{R}^1\text{-X}^1)_m\text{NP}(\text{X}^2\text{-R}^3\text{-OR}^6)_n$ .

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$(X^1)_mNP(X^2-R^3-SH)_n$ ,  $X^2$  is independently a carboxylate, a carboxylic acid,  $-NR^8_2$ ,  $-N^+R^8_3$ , an oxygen atom or sulfur atom,  $R^8$  is H or alkyl, and  $R^5$  is H or an ester protecting group.

80. (Original) The method of Claim 78, wherein said mixing comprising mixing nanoparticles of the formula  $(R^1-X^1)_mNP(X^2-R^3-Z)_n$ , where NP consists essentially of a metal and  $X^2$  is a carboxylate, a carboxylic acid or S, with said compound of the formula H-Nu-Y, H-Nu- $R^4$ -Y or a salt thereof, where NuH is  $-NHR^8$ , OH or SH (except that NuH is OH when  $X^2$  is said carboxylate or carboxylic acid) and  $R^8$  is H or alkyl.
81. (Original) The method of Claim 78, wherein NP consists essentially of silicon or a silicon-germanium mixture,  $X^2$  is alkylene or O, and said compound of the formula H-Y, H-Nu-Y, or H-Nu- $R^4$ -Y is either H-Nu-Y or H-Nu- $R^4$ -Y, where H-Nu is COOH,  $NHR^8$  or SH, and  $R^8$  is H or alkyl.
82. (Original) The method of Claim 78, comprising mixing nanoparticles of the formula  $(R^1-X^1)_mNP(X^2-R^3-Z)_n$  with a compound of the formula H-Y or a salt thereof.
83. (Original) The method of Claim 78, wherein Y is a cyanide, azide, hydroxide or sulfide anion.
84. (Original) The method of Claim 78, comprising mixing nanoparticles of the formula  $(R^1-X^1)_mNP(X^2-R^3-Nu-H)_n$  or a salt thereof with a compound of the formula Z-Y or Z- $R^4$ -Y.
85. (Original) The method of Claim 84, wherein Nu comprises a chalcogenide atom, a phenolate anion, an amine, a carboxylate or an aryl group, and said compound of the formula Z-Y or Z- $R^4$ -Y comprises an aliphatic carboxylic acid anhydride, an allyl halide, or an aliphatic acyl chloride.

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86. (Original) A method of making the compound of Claim 21, comprising the steps of
- a) reacting nanoparticles of the formula  $(R^1-X^1)_mNP(X^1-R^3-(CR=CR'R''))_k$ , where  $k$  is an integer greater than 1, NP,  $R^1$  and  $X^1$  are as defined in Claim 21,  $R^3$  is  $R^2$  or a precursor thereof, and R,  $R'$  and  $R''$  are independently H,  $C_1-C_6$  alkyl,  $C_2-C_6$  alkenyl,  $C_1-C_6$  alkoxy, mono- or di- $C_1-C_6$  alkyl amino, a cyclic amino group,  $C_6-C_{10}$  aryl (which may be substituted one or more times with  $C_1-C_6$  alkyl,  $C_2-C_6$  alkenyl,  $C_1-C_6$  alkoxy, mono- or di- $C_1-C_6$  amino or halogen);  $-C(=O)O-C_1-C_6$  alkyl or  $-C(=O)C_1-C_6$  alkyl, with an epoxidizing agent or source of  $Y^+$ ,  $Y^-$  or  $Y\cdot$ ; and
  - b) isolating and/or purifying said compound of the formula (1) from said reaction mixture.
87. (Original) The method of Claim 86, wherein R,  $R'$  and  $R''$  are independently H or  $C_1-C_6$  alkyl.
88. (Original) The method of Claim 86, wherein said reacting is with said epoxidizing agent.
89. (Original) The method of Claim 86, wherein said reacting is with said  $Y^+$  source and comprises electrophilically adding Y from Z-Y to the  $CR=CR'R''$  group.
90. (Original) The method of Claim 86, wherein said reacting is with said  $Y^-$  source and comprises electrophilically adding HY to the  $CR=CR'R''$  group.
91. (Original) The method of Claim 86, wherein said reacting is with said  $Y\cdot$  source and comprises radical addition of Y from HY or  $Y_2$  to the  $CR=CR'R''$  group.
92. (Original) A method of making an electronically functional thin film, comprising the steps of:

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- a) irradiating the ink of Claim 38 to form an irradiated composition; and
  - b) curing said irradiated composition to form said electronically functional thin film.
93. (Original) The method of Claim 92, further comprising, after said irradiating step and before said curing step, the step of developing said irradiated composition to form a patterned thin film.
94. (Original) The method of Claim 93, wherein said irradiating step comprises selectively irradiating portions of said composition, and said developing step comprises removing either irradiated or non-irradiated portions of said layer to form said patterned thin film.
95. (Original) The method of Claim 94, wherein said selectively irradiating substep comprises (i) positioning at least one of said substrate and a mask such that said portions can be selectively irradiated and said non-irradiated portions cannot be irradiated, and (ii) irradiating said layer with ultraviolet light through said mask.
96. (Original) The method of Claim 92, wherein said composition comprises metal, dielectric, phosphor and/or semiconductor nanoparticles.
97. (Original) The method of Claim 96, wherein said nanoparticles comprise metal nanoparticles.
98. (Original) The method of Claim 93, wherein said curing step comprises sintering said developed film to form a patterned electronically functional thin film.
99. (Original) The method of Claim 98, wherein said curing step comprises heating said composition to a temperature of at least about 100 °C for a period of time sufficient to remove substantially all of said ligand(s).

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100. (Original) The method of Claim 99, wherein said curing temperature is at least about 200 °C.
101. (Original) The method of Claim 100, wherein said curing temperature is at least about 300 °C.
102. (Original) The method of Claim 101, wherein said curing temperature is at least about 400 °C.
103. (Original) The method of Claim 99, further comprising heating said electronically functional thin film to a temperature of at least about 200 °C in the presence of a reducing atmosphere to passivate said electronically functional thin film.
104. (Original) The method of Claim 103, wherein said heating temperature is at least about 300 °C.
105. (Original) The method of Claim 92, further comprising depositing said composition on a substrate.
106. (Original) The method of Claim 105, wherein said depositing comprises inkjetting, spin coating, dip coating, meniscus, extrusion or spray coating a solution, emulsion or suspension of said composition on said substrate.
107. (Original) The method of Claim 92, wherein said curing step further comprises placing said substrate into a chamber, and evacuating said chamber.



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108. (Original) The method of Claim 107, wherein said curing step further comprises passing an inert and/or reducing gas into said chamber.
109. (Original) The method of Claim 93, wherein said patterned thin film comprises a two-dimensional array of lines having a width of from 100 nm to 100  $\mu\text{m}$ .
110. (Original) The method of Claim 109, wherein said lines have an inter-line spacing of from 100 nm to 100  $\mu\text{m}$ .
111. (Original) The method of Claim 110, wherein said lines have a length of from 1  $\mu\text{m}$  to 5000  $\mu\text{m}$ .
112. (Original) The method of Claim 109, wherein said lines have a thickness of from 0.01  $\mu\text{m}$  to 100  $\mu\text{m}$ .
- 113-123. (Canceled)

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Remarks

Claims 113-123 have been canceled. Claims 1-112 remain pending in this application.

The Examiner has required restriction between groups of claims in the above-identified application as follows:

- Group I: Claims 1-20, drawn to a radiation patternable functional material;
- Group II: Claims 21-37, drawn to a compound;
- Group III: Claims 38-63, drawn to a radiation definable ink;
- Group IV: Claims 64-73, drawn to a method of making a radiation patternable functional material;
- Group V: Claims 74-91, drawn to a method of making a compound;
- Group VI: Claims 92-112, drawn to a method of making an electronically functional thin film; and
- Group VII: Claims 113-123, drawn to a thin film structure.

Applicants have elected, with traverse, Group I, Claims 1-20, drawn to a radiation patternable functional material.

Restriction is proper only when the groups of claims are (A) independent or distinct as claimed, and (B) there is a serious burden on the Examiner (M.P.E.P. § 803). Claims are independent when there is no disclosed relationship between them; for example, a process and an apparatus that is incapable of being used in practicing the process (M.P.E.P. § 802.01). Claims are distinct when they are related as disclosed, but are capable of separate manufacture, use or sale as claimed, AND ARE PATENTABLE (novel and unobvious) OVER EACH OTHER (M.P.E.P. § 802.01; emphasis in original). Examiners must provide reasons and/or examples in support of their conclusions (M.P.E.P. § 803).

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In this case, the various relationships between the claims in Group I-VI above have been mischaracterized, and the burden of persuasion has not been met with regard to providing logically or legally adequate reasons and/or technically or factually accurate examples in support of the many conclusions of distinctness and/or unrelatedness. Furthermore, by virtue of canceling Claims 113-123 (Group VII), restriction between Group VII and other Groups is moot. As a result, the Restriction Requirement is improper and/or moot, and should be withdrawn.

The Relationship between the Claims in Groups I and II Has Been  
Mischaracterized

The relationship between the claims in Groups I and II has been mischaracterized. The Examiner has concluded that the claims of Groups I and II are unrelated, because the compound is not required to be employed in a radiation sensitive material, and the radiation sensitive material does not require the specifically claimed compound. This reasoning overlooks the language of the claims and the standards for restriction as set forth in M.P.E.P. §§ 802.01 and 803. Thus, the reasons and/or examples in support of the conclusion of unrelatedness are technically and factually inaccurate and logically and legally inadequate.

For example, claim 1 (Group I) is drawn to a radiation patternable functional material, comprising ligands containing a photoreactive group or a group that is reactive with a photochemically generated species and that, after first-order photoreaction or reacting with said photochemically generated species, materially changes the solubility characteristics of said material in a developer. Claim 21 (Group II) is drawn to a compound containing a group that is photoreactive or that is reactive with a photochemically generated species and which, after first-order photoreaction or reacting with said photochemically generated species, materially changes the solubility characteristics of said compound in a developer. This language from Claim 21 is nearly identical to that in Claim 1 and clearly indicates that the compound of Claim 21 is patternable with light, a well-known form of radiation. Thus, the reason(s) and/or example(s) provided in support of restriction are, at least in part, technically and factually inaccurate.

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The Examiner cites MPEP §§ 806.04 and 808.01 for the principle that inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects. Assuming that this principle was the basis for the conclusion of unrelatedness, it is clear from the language of claims 1 and 21 that the reasoning behind such a conclusion is logically and legally inadequate. By the language of claims 1 and 21 cited in the preceding paragraph, claims 1 and 21 (and, consequently, all claims dependent therefrom in Groups I and II) are capable of use together and they have a common mode of operation, a common function, and a common effect.

Thus, limitations common to claims 1 and 21 appear to have been overlooked. As a result, the relationship between the claims in Groups I and II has been mischaracterized, and the reason(s) and/or example(s) provided in support of the conclusion of unrelatedness are logically and legally inadequate. Consequently, the reason(s) and/or example(s) do not carry the burden of persuasion in support of restriction, and restriction would appear to be improper on this basis.

The Relationship Between the Claims in Groups I and III Has Been Mischaracterized

The relationship between the claims in Groups I and III has been mischaracterized. The Examiner has concluded that the claims of Groups I and III are distinct because, in the Examiner's opinion, the ink could be made employing a different photosensitive material and/or the material of Group I is not required to be employed in an ink. This reasoning overlooks the language of the claims and the standards for restriction as set forth at least in M.P.E.P. §§ 802.01 and 803.

For example, Claim 38 (Group III) is drawn to a radiation definable ink, comprising the material of Claim 1 (Group I). Based on the language of claim 38, it is not known how the ink of Group III could be made employing a photosensitive material other than the material of Claim 1 (Group I). Thus, the first reason and/or example relied upon for supporting restriction and the conclusion of distinctness is technically and factually inaccurate.

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Furthermore, restriction on the basis that the material of Group I (containing independent Claim 1) is not required to be employed in the ink of dependent Claim 38 (Group III) falls rather short of legal requirements for restriction. Requiring restriction in such a manner is analogous to requiring restriction between any dependent claim and the independent claim from which it depends. By definition, a dependent claim (such as Claim 38, Group III) further limits the subject matter of an independent claim (such as Claim 1, Group I) and thus, has a narrower scope than the independent claim. As a result, by definition, all of the subject matter of an independent claim is not required (and, in fact, cannot be) employed in a dependent claim. If this was a proper legal standard for restriction, the only time restriction could not be required between two claims is when they have exactly the same scope, in which case one of the two claims could be properly rejected under either 35 U.S.C. § 112, fourth paragraph, for failure to further limit a claim, or under 35 U.S.C. § 101 for statutory double patenting. Such logic and/or reasoning, if correct or appropriate, would enable the U.S. Patent and Trademark Office to limit every patent effectively to a single claim. Thus, the alternative reason and/or example given in support of restriction and the conclusion of distinctness (the material of Group I is not required to be employed in the ink of Group III) is logically and legally inadequate.

Thus, it appears that at least some of the language in claim 38 has been overlooked, and as a result, the reason(s) and/or example(s) provided in support of the conclusion of unrelatedness are technically and factually inaccurate and logically and legally inadequate. Consequently, the relationship between the claims in Groups I and III has been mischaracterized, and the reason(s) and/or example(s) do not carry the burden of persuasion in support of restriction between Groups I and III. Restriction would appear to be improper on this basis.

No Plausible or Accurate Reason or Example in Support of Restriction Between the  
Claims in Groups I and IV Has Been Provided

The relationship between the claims in Groups I and IV has been mischaracterized. The Examiner has concluded that the claims of Groups I and IV are distinct, because the process (of

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Group IV) is generic and could be employed to prepare many other materials having different compositions than that of Group I. This reasoning is technically and factually inaccurate, and it overlooks the language of the claims and the standards for restriction as set forth at least in M.P.E.P. §§ 802.01 and 803.

For example, claim 64 (Group IV) is drawn to a "method of making the material of Claim 1" (Group I). Based on the language of claim 64, it is not known how the method of Group IV could be used to make a material having a composition that differs from that of Claim 1 (Group I). Thus, the reason(s) and/or example(s) relied upon for supporting restriction and the conclusion of distinctness are technically and factually inaccurate.

Thus, the language in Claim 64 has been overlooked, and the relationship between the claims in Groups I and IV has been mischaracterized. As a result, the reason(s) and/or example(s) provided in support of restriction and the conclusion of distinctness are technically and factually inaccurate and logically and legally inadequate. Consequently, the reason(s) and/or example(s) given do not carry the burden of persuasion in support of the conclusion of distinctness between Groups I and IV, and restriction would appear to be improper on this basis.

The Relationship Between the Claims in Groups I and V Has Been Mischaracterized

The relationship between the claims in Groups I and V has been mischaracterized. The Examiner has concluded that the claims of Groups I and V are unrelated because, in the Examiner's opinion, the groups are quite different and there is no relation between the radiation sensitive material of Group I and the method of making a compound of Group V. This reasoning is technically and factually inaccurate and legally and logically inadequate, and it overlooks the language of the claims and the standards for restriction as set forth at least in M.P.E.P. §§ 802.01 and 803. In fact, it appears that the conclusion of unrelatedness has been merely restated as a reason and/or example in support of finding the same.

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In any case, Claim 74 (Group V) is drawn to a "method of making the compound of Claim 21" (Group II). As explained above, Claim 21 (Group II) is drawn to a compound containing a group that is photoreactive or that is reactive with a photochemically generated species and which, after first-order photoreaction or reacting with said photochemically generated species, materially changes the solubility characteristics of said compound in a developer. Claim 1 (Group I) is drawn to a radiation patternable functional material, comprising ligands containing a photoreactive group or a group that is reactive with a photochemically generated species and that, after first-order photoreaction or reacting with said photochemically generated species, materially changes the solubility characteristics of said material in a developer, language nearly identical to that in claim 21 and clearly indicating a mode of operation, a function, and an effect common with the compound of Claim 21 (Group II). Because of the common mode of operation, function and effect(s), the material of Claim 1 (Group I) and the compound of Claim 21 (Group II) are clearly capable of use together. Many of the compounds of Claim 21 (Group II) are encompassed by the material of Claim 1 (Group I). The overlap between the compounds of Claim 21 (Group II) and the material of Claim 1 (Group I) is unmistakable. Thus, it is clear that the method of Claim 74 (Group V) can be used to make a great number of the materials encompassed by Claim 1 (Group I).

Consequently, the statement to the effect that Groups I and V are quite different and there is no relation between them is technically and factually inaccurate. Based on the language of Claims 1, 21 and 74, the method of Claim 74 (Group V) is clearly related to the material of Claim 1 (Group I). Thus, the reason(s) and/or example(s) provided in support of restriction are technically and factually inaccurate, and the conclusion of distinctness in reliance on such reason(s) and/or example(s) is logically and legally inadequate.

Thus, the language of Claim 74 and limitations common to Claims 1 and 21 have been overlooked, and the relationship between the claims in Groups I and V has been mischaracterized. As a result, the reason(s) and/or example(s) provided in support of restriction do not carry the burden of persuasion in support of the conclusion of unrelatedness between Groups I and V. Restriction would appear to be improper on this basis.

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The Relationship Between the Claims in Groups I and VI Has Been Mischaracterized

The relationship between the claims in Groups I and VI has been mischaracterized. The Examiner has concluded that the claims of Groups I and VI are unrelated, because the material may be coated onto a substrate and used to form a pattern in and of itself. This reasoning overlooks the language of the claims and the standards for restriction as set forth at least in M.P.E.P. §§ 802.01 and 803.

For example, Claim 92 (Group VI) is drawn to a method of making an electronically functional thin film, comprising irradiating the ink of Claim 38 (Group III). As explained above, Claim 38 is drawn to a radiation definable ink, comprising the material of Claim 1 (Group I). Thus, Claim 92 depends indirectly from Claim 1. Thus, the conclusion that the claims of Groups I and VI are unrelated is technically and factually inaccurate.

The reasoning and logic supporting the conclusion of unrelatedness between Groups I and VI is analogous to requiring restriction between any two claims in which one claim depends indirectly from the other. By definition, an indirectly dependent claim (such as claim 92, Group VI) incorporates limitations from a dependent claim that are not present in an independent claim (such as claim 1, Group I). In theory, any claim that depends indirectly from an independent claim can be rewritten as a directly dependent claim without affecting the scope of the claim. As a result, if the logic supporting restriction between Groups I and VI was correct or appropriate, the U.S. Patent and Trademark Office would be able to limit every patent to independent and directly dependent claims. However, one can easily imagine the large number of patents issued by the U.S. Patent and Trademark Office that contain indirectly dependent claims. Thus, the reason(s) and/or example(s) given in support of restriction and the conclusion of unrelatedness are logically and legally inadequate.

The fact that Claim 92 (Group VI) depends indirectly from Claim 1 (Group I) appears to have overlooked. As a result, the reason(s) and/or example(s) provided in support of restriction and the conclusion of unrelatedness are logically and legally inadequate and technically and factually incorrect. Consequently, the Examiner's reason(s) and/or example(s) do not carry the



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burden of persuasion in support of the conclusion that Groups I and VI are unrelated, and restriction would appear to be improper on this basis.

Restriction Between Groups I and VII Is Moot

As a result of the cancellation of Claims 113-123, restriction between the claims in Groups I and VII is moot.

The Relationship Between the Claims in Groups II and III Has Been  
Mischaracterized

The Examiner has mischaracterized the relationship between the claims in Groups II and III. The Examiner has concluded that the claims of Groups II and III are unrelated because, in the Examiner's opinion, the groups are drawn to two distinct inventions, the compound of Group II is not required to be used in the printing ink, nor does the printing ink (presumably of Group III) require the use of the compound. This reasoning is technically and factually inaccurate, logically and legally inadequate, and it overlooks the language of the claims and the standards for restriction as set forth at least in M.P.E.P. §§ 802.01 and 803.

For example, Claim 38 (Group III) is drawn to a radiation definable ink (rather than a printing ink), comprising the material of Claim 1 (Group I). As explained above, Claim 1 (Group I) is drawn to a radiation patternable functional material, comprising ligands containing a photoreactive group or a group that is reactive with a photochemically generated species and that, after first-order photoreaction or reacting with said photochemically generated species, materially changes the solubility characteristics of said material in a developer. Similarly, Claim 21 (Group II) is drawn to a compound containing a group that is photoreactive or that is reactive with a photochemically generated species and which, after first-order photoreaction or reacting with said photochemically generated species, materially changes the solubility characteristics of said compound in a developer, language nearly identical to that in Claim 1 and clearly indicating a mode of operation, a function, and an effect common with the material of Claim 1 (Group I).

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Because of the common mode of operation, function and effect(s), the material of Claim 1 (Group I) and the compound of Claim 21 (Group II) are clearly capable of use together. Also, as explained above, many of the compounds of Claim 21 (Group II) are encompassed by the material of Claim 1 (Group I), and the overlap between the compounds of Claim 21 (Group II) and the material of Claim 1 (Group I) is unmistakable. Thus, it is clear that the ink of Claim 38 (Group III) is related to the compound of Claim 21 (Group II), and the statement to the effect that Groups II and III are unrelated is technically and factually inaccurate.

MPEP §§ 806.04 and 808.01 are cited for the principle that inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects. Assuming this principle was a basis for the conclusion of unrelatedness, it is clear from the language of Claims 1, 21 and 38 that the conclusion is logically and legally inadequate.

Thus, the language of Claim 38 and limitations common to Claims 1 and 21 appear to have been overlooked, and the relationship between the claims in Groups II and III has been mischaracterized. As a result, the reason(s) and/or example(s) provided in support of restriction do not carry the burden of persuasion in support of the conclusion of unrelatedness between Groups II and III. Restriction would appear to be improper on this basis.

#### The Relationship Between the Claims in Groups II and IV Has Been Mischaracterized

The relationship between the claims in Groups II and IV has been mischaracterized. The Examiner has concluded that the claims of Groups II and IV are unrelated because, in the Examiner's opinion, the compound of Group II is not required to be used in any photosensitive material, nor does the method (presumably that of Group IV) of making the material require the use of that specific compound. This reasoning is technically and factually inaccurate, logically and legally inadequate, and it overlooks the language of the claims and the standards for restriction as set forth at least in M.P.E.P. §§ 802.01 and 803.

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For example, Claim 64 (Group IV) is drawn to a "method of making the material of Claim 1" (Group I). Claim 64 (Group IV) does not contain any language or limitations requiring use of something in a photosensitive material. Thus, the statement to the effect that the compound of Group II is not required to be used in any photosensitive material bears no relation to restriction between Groups II and IV, and appears to be somewhat nonsensical in this context. However, as explained above, the subject matter of Claim 1 (Group I) is quite clearly and unmistakably related to the subject matter of Claim 21 (Group II). Thus, the method of Claim 64 (Group IV), which is directed to making the materials of Group I, is also related to the compound of Claim 21 (Group II), and any conclusion of unrelatedness between Groups II and IV is technically and factually inaccurate.

MPEP §§ 806.04 and 808.01 are cited for the principle that inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects. Assuming this principle was a basis for the conclusion of unrelatedness, it is clear from the language of Claims 1, 21 and 64 that the conclusion is logically and legally inadequate.

Furthermore, the alternative reason and/or example in support of restriction between Groups II and IV (the method of making the material does not require the use of the specific compound) does not apply the proper or correct legal standard. The alternative example appears to suggest that as long as the scope of the compounds in the restricted claims is different, restriction is proper. Such logic is similar to that justifying restriction between an independent claim and claims dependent therefrom (e.g., as discussed above). According to the Examiner's own reasoning, restriction is proper when the groups are unrelated. As explained above, Groups II and IV are related. Thus, the reason(s) and/or example(s) relied upon for supporting the conclusion of unrelatedness are technically and factually inaccurate and logically and legally inadequate, and the relationship between the claims in Groups II and IV has been mischaracterized.

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As a result, the reason(s) and/or example(s) provided in support of restriction do not carry the burden of persuasion in support of the conclusion of unrelatedness between Groups II and IV. Restriction would appear to be improper on this basis.

No Adequate Reason or Actual Example in Support of Restriction Between the Claims in Groups II and V Has Been Provided

No adequate reason or actual example to support restriction between the claims in Groups II and V has been provided. The Examiner has concluded that the claims of Groups II and V are distinct because, in the Examiner's opinion, the compound (of Group II) may be made employing a process different from that of Group V, and the process may be employed to prepare a different product. This reasoning is technically and factually inaccurate and logically and legally inadequate, and it overlooks the language of the claims and the standards for restriction as set forth at least in M.P.E.P. §§ 802.01 and 803.

For example, the bare statement that the compound may be made by a different process is not an actual example of a different process. This statement fails to explain or suggest in any way whatsoever the different steps, reagents or conditions that one would use to make the claimed compound. As a result, one has no idea whatsoever whether such a different process is even theoretically possible. Such unsupported conjecture is logically and legally inadequate to support restriction and does not provide an actual (much less plausible) reason or example to support a conclusion of distinctness.

Furthermore, Claim 74 (Group V) is drawn to a "method of making the material of Claim 21" (Group II). Based on the language of Claim 74, it is not known how the method of Group V could be used to make a material having a composition that differs from that of Claim 21 (Group II). Thus, the second reason and/or example relied upon for supporting restriction and the conclusion of distinctness is technically and factually incorrect.

Thus, the language in Claims 21 and 74 appears to have been overlooked, and no adequate reason or actual example to support restriction between the claims in Groups II and V

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has been provided. As a result, the reason(s) and/or example(s) do not carry the burden of persuasion in support of the conclusion of distinctness between Groups II and V, and restriction would appear to be improper on this basis.

The Relationship Between the Claims in Groups II and VI Has Been  
Mischaracterized

The relationship between the claims in Groups II and VI has been mischaracterized. The Examiner has concluded that the claims of Groups II and VI are unrelated because, in the Examiner's opinion, the compound is not required to be employed in any process of making a thin film, nor does the process require the compound of group II. This reasoning is technically and factually inaccurate, logically and legally inadequate, and it overlooks the language of the claims and the standards for restriction as set forth at least in M.P.E.P. §§ 802.01 and 803.

For example, Claim 92 (Group VI) is drawn to a method of making an electronically functional thin film, comprising irradiating the ink of Claim 38, which in turn, comprises the material of Claim 1. The relationship and overlap between Claim 1 (Group I) and the compound of Claim 21 (Group II) has been explained in detail herein. Thus, contrary to the unsupported assertion in the Office Action, the method of Claim 92 (Group VI) is related to the compound of Claim 21 (Group II), and any conclusion of unrelatedness between Groups II and VI is technically and factually inaccurate.

MPEP §§ 806.04 and 808.01 are cited for the principle that inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects. Assuming this principle is a basis for the conclusion of unrelatedness, it is clear from the language of Claims 1, 21, 38 and 92 that the conclusion is logically and legally inadequate.

Consequently, the relationship between the claims in Groups II and VI has been mischaracterized. As a result, the reason(s) and/or example(s) provided in support of the

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conclusion of unrelatedness do not carry the burden of persuasion in support of restriction between Groups II and VI. Restriction would appear to be improper on this basis.

Restriction Between Groups II and VII Is Moot

As a result of the cancellation of Claims 113-123, restriction between the claims in Groups II and VII is moot.

The Relationship Between the Claims in Groups III and IV Has Been  
Mischaracterized

The relationship between the claims in Groups III and IV has been mischaracterized. The Examiner has concluded that the claims of Groups II and III are unrelated because, in the Examiner's opinion, the ink (Group III) is unrelated to the method of preparing a photosensitive material of Group IV. This reasoning is technically and factually inaccurate, logically and legally inadequate, and it overlooks the language of the claims and the standards for restriction as set forth at least in M.P.E.P. §§ 802.01 and 803.

For example, Claim 38 (Group III) is drawn to a radiation definable ink (rather than a printing ink), comprising the material of Claim 1 (Group I). Claim 64 (Group IV) is drawn to a method of making the material of Claim 1 (Group I). Thus, it is clear that the ink of Claim 38 (Group III) is related to the method of Claim 64 (Group IV), and the reason(s) and/or example(s) relied upon for supporting restriction and the conclusion of unrelatedness are technically and factually incorrect. Restriction thus appears to be required between Groups III and IV on the mere basis that Claims 38 and 64 are different dependent claims (even though they depend from the same independent claim). As such, the conclusion of unrelatedness appears to be logically and legally inadequate.

The language of Claims 38 and 64 thus appears to have been overlooked, and the relationship between the claims in Groups III and IV has been mischaracterized. As a result, the

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reason(s) and/or example(s) provided in support of the conclusion of unrelatedness do not carry the burden of persuasion in support of restriction between Groups III and IV. Restriction would appear to be improper on this basis.

The Relationship Between the Claims in Groups III and V Has Been  
Mischaracterized

The relationship between the claims in Groups III and V has been mischaracterized. The Examiner has concluded that the claims of Groups III and V are unrelated because, in the Examiner's opinion, the ink (of Group III) is unrelated to the method of preparing the compound of Group V. This reasoning is technically and factually inaccurate, logically and legally inadequate, and it overlooks the language of the claims and the standards for restriction as set forth at least in M.P.E.P. §§ 802.01 and 803.

For example, Claim 38 (Group III) is drawn to a radiation definable ink (rather than a printing ink), comprising the material of Claim 1 (Group I). Claim 74 (Group V) is drawn to a "method of making the material of Claim 21" (Group II). The relationship and overlap between Claim 1 (Group I) and the compound of Claim 21 (Group II) has been explained in detail herein. Thus, contrary to the unsupported assertion in the Office Action, the method of Claim 74 (Group V) is related to the ink of Claim 38 (Group III), and the assertion to the contrary is technically and factually inaccurate.

MPEP §§ 806.04 and 808.01 are cited for the principle that inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects. Assuming this principle was a basis for the conclusion of unrelatedness, it is clear from the language of Claims 1, 21, 38 and 74 that the conclusion is logically and legally inadequate.

Thus, the relationship between the claims in Groups III and V has been mischaracterized, and the reason(s) and/or example(s) provided in support of the conclusion of unrelatedness do

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not carry the burden of persuasion in support of restriction between Groups III and V. Restriction would appear to be improper on this basis.

No Adequate Reason or Actual Example in Support of Restriction Between the  
Claims in Groups III and VI Has Been Provided

No adequate reason or actual example to support restriction between the claims in Groups III and VI has been provided. The Examiner has concluded that the claims of Groups III and VI are distinct because, in the Examiner's opinion, the ink of Group III is not required to be employed in the method of Group VI, nor does the method of Group VI require the use of the photosensitive ink of Group III. This reasoning is technically and factually inaccurate, logically and legally inadequate, and it overlooks the language of the claims and the standards for restriction as set forth at least in M.P.E.P. §§ 802.01 and 803.

For example, Claim 92 (Group VI) is drawn to a method of making an electronically functional thin film, comprising irradiating the ink of Claim 38 (Group III). Based on the language of Claim 92, it would appear that the ink of Group III is required to be employed in the method of Group VI, and that the method of Group VI does require the ink of Group III. Thus, the reason(s) and/or example(s) relied upon for supporting restriction and the conclusion of distinctness are technically and factually incorrect.

The language in Claims 38 and 92 appears to have been overlooked, and no reason or example that can support the conclusion of distinctness between the claims in Groups III and VI has been provided. As a result, the reason(s) and/or example(s) given logically and legally inadequate, and they do not carry the burden of persuasion in support of restriction between Groups III and VI. Restriction would appear to be improper on this basis.

Restriction Between Groups III and VII Is Moot

As a result of the cancellation of Claims 113-123, restriction between the claims in Groups III and VII is moot.



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The Relationship Between the Claims in Groups IV and V Has Been Mischaracterized

The relationship between the claims in Groups IV and V has been mischaracterized. The Examiner has concluded that the claims of Groups IV and V are unrelated because, in the Examiner's opinion, the method of making a photosensitive material (Group IV) is completely unrelated to the method of making a compound (Group V). This reasoning is technically and factually inaccurate, logically and legally inadequate, and it overlooks the language of the claims and the standards for restriction as set forth at least in M.P.E.P. §§ 802.01 and 803. It appears that the conclusion of unrelatedness has been merely restated as a reason and/or example in support of finding the same.

For example, Claim 64 (Group IV) is drawn to a method of making the material of Claim 1 (Group I). Claim 74 (Group V) is drawn to a "method of making the material of Claim 21" (Group II). The relationship and overlap between Claim 1 (Group I) and the compound of Claim 21 (Group II) has been explained in detail herein. Thus, contrary to the unsupported assertion in the Office Action, the method of Claim 64 (Group IV) is related to the method of Claim 74 (Group V), and any assertion to the contrary is technically and factually inaccurate.

MPEP §§ 806.04 and 808.01 is cited for the principle that inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects. Assuming this principle was a basis for the conclusion of unrelatedness, it is clear from the language of Claims 1, 21, 64 and 74 that the conclusion is logically and legally inadequate.

Thus, the relationship between the claims in Groups IV and V has been mischaracterized. As a result, the reason(s) and/or example(s) provided in support of the conclusion of unrelatedness do not carry the burden of persuasion in support of restriction between Groups IV and V. Restriction would appear to be improper on this basis.

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The Relationship Between the Claims in Groups IV and VI Has Been Mischaracterized

The relationship between the claims in Groups IV and VI has been mischaracterized. The Examiner has concluded that the claims of Groups IV and VI are unrelated because, in the Examiner's opinion, the method of making a photosensitive material (Group IV) is completely unrelated to the method of making a film (Group VI). This reasoning is technically and factually inaccurate, logically and legally inadequate, and it overlooks the language of the claims and the standards for restriction as set forth at least in M.P.E.P. §§ 802.01 and 803. Again, the conclusion of unrelatedness appears to have been restated as a reason and/or example in support of finding the same.

For example, Claim 64 (Group IV) is drawn to a method of making the material of Claim 1 (Group I). Claim 92 (Group VI) is drawn to a method of making an electronically functional thin film, comprising irradiating the ink of Claim 38, which in turn comprises the material of Claim 1 (Group I). Thus, it is clear that the method of Claim 64 (Group IV) is related to the method of Claim 92 (Group VI), and the assertion to the contrary is technically and factually inaccurate. As a result, the reason(s) and/or example(s) relied upon for supporting restriction and the conclusion of unrelatedness are logically and legally inadequate. Restriction appears to be required between Groups IV and VI on the mere basis that Claims 64 and 94 are different dependent claims (even though they depend directly or indirectly from the same independent claim).

Thus, the language of Claims 64 and 94 appears to have been overlooked, and the relationship between the claims in Groups IV and VI has been mischaracterized. As a result, the reason(s) and/or example(s) provided in support of the conclusion of unrelatedness do not carry the burden of persuasion in support of restriction between Groups IV and VI. Restriction would appear to be improper on this basis.

Restriction Between Groups IV and VII Is Moot

As a result of the cancellation of Claims 113-123, restriction between the claims in Groups IV and VII is moot.

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The Relationship Between the Claims in Groups V and VI Has Been Mischaracterized

The relationship between the claims in Groups V and VI has been mischaracterized. The Examiner has concluded that the claims of Groups V and VI are unrelated because, in the Examiner's opinion, the method of making the compound (Group V) is unrelated to the method of making the thin film device of group VI. This reasoning is simply a restatement of the premise of unrelatedness as the reason and/or example supporting the conclusion for finding the same. It is technically and factually inaccurate and logically and legally inadequate, and it overlooks the language of the claims and the standards for restriction as set forth at least in M.P.E.P. §§ 802.01 and 803.

For example, Claim 74 (Group V) is drawn to a "method of making the material of Claim 21" (Group II). Claim 92 (Group VI) is drawn to a method of making an electronically functional thin film, comprising irradiating the ink of Claim 38, which in turn comprises the material of Claim 1 (Group I). The relationship and overlap between the material of Claim 1 (Group I) and the compound of Claim 21 (Group II) has been explained in detail herein. Thus, contrary to the unsupported assertion in the Office Action, the method of Claim 74 (Group V) is related to the method of Claim 92 (Group VI). Consequently, any conclusion of unrelatedness between Groups V and VI is logically and legally inadequate.

Thus, the relationship between the claims in Groups V and VI has been mischaracterized. As a result, the reason(s) and/or example(s) provided in support of the conclusion of unrelatedness are technically and factually inaccurate and do not carry the burden of persuasion in support of restriction between Groups IV and V. In this case, the premise of unrelatedness has simply been restated as the reason and/or example supporting the conclusion for finding the same. Restriction is improper on this basis.

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Restriction Between Groups V and VII and Between Groups VI and VII Is Moot

As a result of the cancellation of Claims 113-123, restriction between the claims in Groups V and VII and between the claims in Groups VI and VII is moot.

Conclusions

Applicants have elected, with traverse, Group I, Claims 1-36, drawn to a radiation patternable functional material. However, in view of (1) the mischaracterization of the relationships between the claims in Groups I-VI and (2) the Examiner's failure to provide a single technically or factually accurate or logically or legally adequate reason or example in support of the conclusion of distinctness between the claims in Groups I-VI, the Restriction Requirement is improper and should be withdrawn. Thus, in view of the above amendment, election and remarks, Claims 1-112 are in condition for examination on the merits. Early notice to that effect is earnestly requested.

If it is deemed helpful or beneficial to the efficient prosecution of the present application, the Examiner is invited to contact Applicant's undersigned representative by telephone.

Respectfully submitted,



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## EXHIBIT C

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Amendments to the Claims

Please amend the claims as follows:

1. (Currently Amended) A radiation patternable functional material, comprising:
  - a) nanoparticles of an electronically functional substance selected from the group consisting of semiconductors and metals; and
  - b) a plurality of ligands bound to each of said nanoparticles, said ligands containing a photoreactive group or a group that is reactive with a photochemically generated species and that, after first-order photoreaction or reacting with said photochemically generated species, materially changes the solubility characteristics of said material in a developer,  
wherein, after irradiation, developing and curing, the functional material forms a patterned film of an electronically conducting or semiconducting material.
2. (Currently Amended) The material of Claim 1, wherein said ~~electronically functional substance~~ nanoparticles comprise[[s]] a member of the group consisting of ~~semiconductors, metals, dielectrics~~ passivated nanoparticles and phosphors nanoparticles containing ligands not having a (photo)reactive group bound thereto.
3. (Currently Amended) The material of Claim 12, wherein said electronically functional substance comprises ~~a member of the group consisting of semiconductors and metals~~ that absorbs a first wavelength of UV light.
4. (Currently Amended) The material of Claim 13, wherein said electronically functional substance comprises one or more members of the group consisting of silicon, germanium, CdS, CdSe, InP, InAs and GaAs.
5. (Original) The material of Claim 4, wherein said electronically functional substance comprises silicon.

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6. (Currently Amended) The material of Claim 13, wherein said electronically functional substance comprises one or more members of the group consisting of transition metals, noble metals, aluminum, indium, tin, lead, and alloys thereof.
7. (Original) The material of Claim 6, wherein said electronically functional substance comprises one or more members of the group consisting of Cr, Mo, W, Fe, Ru, Ni, Pd, Pt, copper, silver, gold, and aluminum.
8. (Original) The material of Claim 7, wherein said electronically functional substance comprises nickel, copper, silver or gold.
9. (Currently Amended) The material of Claim 32, wherein said ~~electronically functional substance comprises an oxide, nitride, oxynitride, carbide or sulfide of a metal or metalloid~~ photoreactive group or group that is reactive with said photochemically generated species absorbs a second wavelength of UV light significantly different from said first wavelength of UV light.
10. (Original) The material of Claim 1, wherein said ligands contain a group that is reactive with said photochemically generated species and that, after reacting with said photochemically generated species, materially changes the solubility characteristics of said material in said developer.
11. (Original) The material of Claim 10, wherein said photoreactive group comprises a quinone, and said ligand comprises a phenol.
12. (Original) The material of Claim 1, wherein said ligands are bound to said nanoparticles by covalent, coordination and/or ionic bonds.

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13. (Original) The material of Claim 12, wherein said ligands are bound to said nanoparticles through at least one nanoparticle-binding member selected from the group consisting of an alcoholate, a thiolate, a disulfide, a carboxylate, a carboxylic acid, an amine, a phosphine, a phosphine oxide and an alkyl group.
14. (Original) The material of Claim 1, wherein said group that is reactive with said photochemically generated species is selected from the group consisting of a carbon-carbon double bond, an epoxide, an oxirane, an aziridine, a phenol, a carbonate and a carbamate.
15. (Original) The material of Claim 14, wherein said group that is reactive with said photochemically generated species comprises said carbon-carbon double bond, and said carbon-carbon double bond is selected from the group consisting of a vinyl group, an activated carbon-carbon double bond, an acrylate, and a vinyl ketone.
16. (Original) The material of Claim 1, wherein said nanoparticles have an average diameter of less than 100 nm.
17. (Original) The material of Claim 1, wherein said nanoparticles have an average diameter of less than 10 nm.
18. (Original) The material of Claim 1, wherein said nanoparticles have an average diameter of less than 5 nm.
19. (Original) The material of Claim 1, wherein said photochemically generated species has an ultraviolet absorption maximum at a first wavelength and said nanoparticles have an ultraviolet absorption maximum at a second wavelength, said second wavelength significantly differing from said first wavelength.



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20. (Original) The material of Claim 19, wherein said photoreactive group comprises an azide, said first wavelength is one at which a mercury arc lamp has a relatively strong irradiance, and said nanoparticles comprise a metal having a relatively poor absorbance at said first wavelength.
21. (Currently Amended; Withdrawn) ~~A~~ The material of Claim 1, comprising a compound of the formula (1):



where NP comprises a said nanoparticle of ~~an~~ said electronically functional substance; Y is a said group that is photoreactive or that is reactive with a said photochemically generated species ~~and which, after first order photoreaction or reacting with said photochemically generated species, materially changes the solubility characteristics of said compound in a developer~~; X<sup>1</sup> and X<sup>2</sup> are independently a nanoparticle-binding group; R<sup>1</sup> is a monovalent group that is not reactive with said photochemically generated species; R<sup>2</sup> is a divalent bridging group; m is at least 0, and the m instances of R<sup>1</sup>-X<sup>1</sup> may be the same or different; ~~and~~ n is at least 1, and the n instances of X<sup>2</sup>-R<sup>2</sup>-Y may be the same or different; and m + n is at least 2.

22. (Currently Amended; Withdrawn) ~~The compound~~ material of Claim ~~321~~, wherein said ~~electronically functional substance~~ nanoparticles comprise[[s]] a member of the group consisting of ~~semiconductors~~ passivated nanoparticles and ~~metals~~ nanoparticles containing ligands not having a (photo)reactive group bound thereto.
23. (Currently Amended; Withdrawn) ~~The compound~~ material of Claim 22, wherein said electronically functional substance consists essentially of silicon and/or germanium.
24. (Currently Amended; Withdrawn) ~~The compound~~ material of Claim 22, wherein said electronically functional substance comprises one or more members of the group

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consisting of transition metals, noble metals, aluminum, indium, tin, lead, and alloys thereof.

25. (Currently Amended; Withdrawn) The ~~compound~~ material of Claim 24, wherein said electronically functional substance consists essentially of nickel, copper, silver or gold.
26. (Currently Amended; Withdrawn) The ~~compound~~ of material Claim 22, wherein said electronically functional substance comprises an oxide, nitride, oxynitride, carbide or sulfide of a metal or metalloid.
27. (Currently Amended; Withdrawn) The ~~compound~~ material of Claim 21, wherein R<sup>1</sup> is alkyl, cycloalkyl, aryl or aralkyl, any one of which may be substituted one or more times with a halogen or with a substituent selected from the group consisting of alkyl (except where R<sup>1</sup> = alkyl), cycloalkyl, aryl, aralkyl (except where R<sup>1</sup> = alkyl), alkoxy, alkylthio, alkylcarbonyl, alkoxycarbonyl, alkylcarboxy, alkylamino, dialkylamino, alkylamido, dialkylamido, cycloalkoxy, cycloalkylthio, cycloalkylcarbonyl, cycloalkoxycarbonyl, cycloalkylcarboxy, cycloalkylamino, di(cycloalkyl)amino, (cycloalkyl)(alkyl)amino, cycloalkylamido, di(cycloalkyl)amido, (cycloalkyl)(alkyl)amido, aryloxy, arylthio, arylcarbonyl, aryloxycarbonyl, arylcarboxy, arylamino, diarylamino, (aryl)(alkyl)amino, arylamido, aralkoxy, aralkylthio, aralkylcarbonyl, aralkoxycarbonyl, aralkylcarboxy, aralkylamino, diaralkylamino, (aralkyl)(alkyl)amino, heterocyclyl, trialkylsilyl, and trialkylsilyloxy, each of which may be further substituted with one or more halogens, alkyl groups (except for alkyl substituents on R<sup>1</sup>) and/or alkoxy groups.
28. (Currently Amended; Withdrawn) The ~~compound~~ material of Claim 27, wherein R<sup>1</sup> is C<sub>4</sub>-C<sub>20</sub> alkyl which may be substituted one or more times with a halogen, a C<sub>1</sub>-C<sub>6</sub> alkoxy, C<sub>3</sub>-C<sub>8</sub> cycloalkyl, phenyl and/or C<sub>7</sub>-C<sub>20</sub> aralkyl, each of which (except for halogen) may be further substituted with one or more halogens, C<sub>1</sub>-C<sub>6</sub> alkyl groups and/or C<sub>1</sub>-C<sub>6</sub> alkoxy groups.

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29. (Currently Amended; Withdrawn) The ~~compound~~ material of Claim 21, wherein R<sup>2</sup> is selected from the group consisting of alkylene, alkyleneoxy, alkyleneoxyalkylene, alkyleneoxyalkyleneoxy, alkyleneethio, alkyleneethioalkylene, alkyleneecarbonyl, alkyleneoxycarbonyl, alkyleneecarboxy, alkyleneamino, alkylene(alkyl)amino, alkylene(alkyl)aminoalkylene, alkyleneamido, alkylene(alkyl)amido, cycloalkylene, cycloalkyleneoxy, cycloalkyleneethio, cycloalkyleneecarbonyl, cycloalkyleneoxycarbonyl, cycloalkyleneecarboxy, cycloalkyleneamino, (cycloalkylene)(alkyl)amino, cycloalkyleneamido, (cycloalkylene)(alkyl)amido, arylene, alkylene-arylene, alkylene-arylene-alkylene, aryleneoxy, alkyleneoxyarylene, alkylene-aryleneoxy, aryleneoxyalkylene, aryleneethio, alkylene-aryleneethio, aryleneethioalkylene, aryleneecarbonyl, alkylene-aryleneecarbonyl, aryleneoxycarbonyl, alkylene-aryleneoxycarbonyl, aryleneecarboxy, alkylene-aryleneecarboxy, aryleneamino, alkylene-aryleneamino, arylene(aryl)-amino, alkylene-arylene(aryl)amino, arylene(alkyl)amino, alkylene-arylene(alkyl)amino, alkylene(aryl)amino, aryleneamido, aralkylene, aralkyleneoxy, (alkylene)aralkyleneoxy, aralkyleneethio, aralkyleneecarbonyl, aralkyleneoxycarbonyl, aralkyleneecarboxy, aralkyleneamino, aralkylene(aryl)amino, (aralkylene)(alkyl)amino, (alkylene)(aralkyl)amino, heterocyclylene, alkylene-heterocyclylene, and alkylene-heterocyclylene-alkylene, each of which may be further substituted with one or more halogens, alkyl groups (except where R<sup>2</sup> = alkylene), alkoxy groups, trialkylsilyl, and/or trialkylsilyloxy groups.
30. (Currently Amended; Withdrawn) The ~~compound~~ material of Claim 29, wherein R<sup>2</sup> is selected from the group consisting of alkylene, alkylene substituted with one or more halogens and/or alkoxy groups, alkyleneoxy, alkyleneoxyalkylene, alkyleneoxyalkyleneoxy, alkylene(alkyl)amino, cycloalkylene, arylene, arylene substituted with one or more halogens, alkyl groups and/or alkoxy groups, aryleneoxy, aryleneethio, arylene(alkyl)amino, aralkylene, (alkylene)aralkylene, and aralkylene(alkyl)amino.

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31. (Currently Amended; Withdrawn) The ~~compound~~ material of Claim 30, wherein R<sup>2</sup> is selected from the group consisting of C<sub>4</sub>-C<sub>20</sub>, branched or unbranched, saturated or unsaturated alkylene groups; C<sub>7</sub>-C<sub>17</sub>, branched or unbranched, substituted or unsubstituted aralkylene groups; C<sub>4</sub>-C<sub>20</sub>, branched or unbranched, saturated or unsaturated alkyleneoxy groups; and C<sub>4</sub>-C<sub>20</sub>, branched or unbranched, saturated or unsaturated alkylene thio groups.
32. (Currently Amended; Withdrawn) The ~~compound~~ material of Claim 21, wherein Y is reactive with a photochemically generated species and which, after reacting with said photochemically generated species, materially changes the solubility characteristics of said material in said developer.
33. (Currently Amended; Withdrawn) The ~~compound~~ material of Claim 32, wherein Y is selected from the group consisting of a carbon-carbon double bond, an epoxide, an oxirane, an aziridine, and a phenol.
34. (Currently Amended; Withdrawn) The ~~compound~~ material of Claim 32, wherein Y is selected from the group consisting of a vinyl group, a vinylidene group, an epoxide, a carbonate, a carbamate and a phenol.
35. (Currently Amended; Withdrawn) The ~~compound~~ material of Claim 34, wherein Y comprises a vinyl group or a vinylidene group substituted with a halogen, a C<sub>1</sub>-C<sub>6</sub> alkyl group, a C<sub>1</sub>-C<sub>6</sub> alkoxy group, a phenyl group, a phenyl group substituted with one or more halogens, C<sub>1</sub>-C<sub>6</sub> alkyl groups, C<sub>1</sub>-C<sub>6</sub> alkoxy groups and/or di-(C<sub>1</sub>-C<sub>6</sub> alkyl)amino groups, a -C(=O)-C<sub>1</sub>-C<sub>6</sub> alkyl group, a -C(=O)-C<sub>1</sub>-C<sub>6</sub> alkoxy group, or a cyano group.
36. (Currently Amended; Withdrawn) The ~~compound~~ material of Claim 21, wherein X<sup>1</sup> and X<sup>2</sup> are independently a chalcogen, a carboxylate group, a carboxylic acid group, a

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thiocarboxylate group, a thiocarboxylic acid group, an alkylene group,  $\text{NR}^5_u$  (where  $u$  is from 0 to 2 and each  $\text{R}^5$  is independently H or a  $\text{C}_1\text{-C}_6$  alkyl group),  $\text{S(O)}_x$  (where  $x$  is from 1 to 3),  $\text{PR}^7_v$  (where  $v$  is from 0 to 3 and each  $\text{R}^7$  is independently H, a  $\text{C}_1\text{-C}_6$  alkyl group or a  $\text{C}_6\text{-C}_{10}$  aryl group which may be substituted with one or more halogen,  $\text{C}_1\text{-C}_4$  alkyl,  $\text{C}_1\text{-C}_4$  alkoxy, or di- $\text{C}_1\text{-C}_4$  alkylamino groups) or  $\text{P(O)}_y(\text{R}^6)_z$  (where  $y$  is from 1 to 3,  $z$  is 1 or 2, and each  $\text{R}^6$  is independently H, phenyl or a  $\text{C}_1\text{-C}_6$  alkyl group).

37. (Currently Amended; Withdrawn) The ~~compound~~ material of Claim 36, wherein  $\text{X}^1$  and  $\text{X}^2$  are independently at least one nanoparticle-binding member is selected from the group consisting of O, S, a carboxylate, a carboxylic acid group, and a  $-\text{CH}_2\text{CH}_2-$  group.
38. (Original; Withdrawn) A radiation definable ink, comprising:
- a) the material of Claim 1; and
  - b) a solvent in which said material is soluble.
39. (Original; Withdrawn) The ink of Claim 38, further comprising a source of said photochemically generated species.
40. (Original; Withdrawn) The ink of Claim 39, wherein said source of said photochemically generated species is selected from the group consisting of azides, photogenerated acid sources, photogenerated radical sources, carbonates, carbamates, and quinones.
41. (Original; Withdrawn) The ink of Claim 39, wherein said source of said photochemically generated species is an azide, and said group that is reactive with said photochemically generated species comprises said carbon-carbon double bond.
42. (Original; Withdrawn) The ink of Claim 39, wherein said source of said photochemically generated species is a photogenerated acid source, and said group that is reactive with

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said photochemically generated species is selected from the group consisting of an epoxide, an oxirane, an aziridine, and an activated carbon-carbon double bond.

43. (Original; Withdrawn) The ink of Claim 39, wherein said source of said photochemically generated species is a photogenerated radical source, and said group that is reactive with said photochemically generated species comprises an acrylate.
44. (Original; Withdrawn) The ink of Claim 38, wherein said ligands contain said photochemically reactive group, and said photochemically reactive group comprises a carbonate and/or a carbamate.
45. (Original; Withdrawn) The ink of Claim 38, wherein said photoreactive group comprises a quinone, and said ligand comprises a phenol.
46. (Original; Withdrawn) The ink of Claim 38, wherein said material is present in said ink in a percentage by weight of from 0.1% to 50%.
47. (Original; Withdrawn) The ink of Claim 38, wherein said solvent is selected from the group consisting of alkanes, alkenes, halogenated alkanes, halogenated alkenes, arenes, substituted arenes, alcohols, ethers, cyclic ethers, aliphatic ketones, aliphatic esters, aliphatic amides and aliphatic sulfoxides.
48. (Original; Withdrawn) The ink of Claim 47, wherein said solvent is selected from the group consisting of C<sub>6</sub>-C<sub>20</sub> alkanes, C<sub>6</sub>-C<sub>20</sub> alkenes, benzene which may be substituted with from 1 to 3 C<sub>1</sub>-C<sub>4</sub> alkyl groups, C<sub>1</sub>-C<sub>6</sub> aliphatic alcohols, C<sub>4</sub>-C<sub>20</sub> ethers, C<sub>4</sub>-C<sub>20</sub> polyethers, C<sub>4</sub>-C<sub>10</sub> aliphatic ketones, and C<sub>1</sub>-C<sub>6</sub> aliphatic esters of C<sub>2</sub>-C<sub>12</sub> aliphatic carboxylic acids that may be substituted with from 1 to 3 halogen atoms or a C<sub>1</sub>-C<sub>4</sub> alkoxy group.

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49. (Original; Withdrawn) The ink of Claim 48, wherein said solvent comprises propylene glycol methyl ether acetate or ethyl ethoxypropionate.
50. (Original; Withdrawn) The ink of Claim 47, further comprising one or more additives selected from the group consisting of a tension reducing agent, a surfactant, a thickening agent, and an adhesion promoter.
51. (Original; Withdrawn) The ink of Claim 50, further comprising said adhesion promoter.
52. (Original; Withdrawn) The ink of Claim 51, wherein said adhesion promoter comprises a C<sub>6</sub>-C<sub>20</sub>, branched or unbranched, mono- or polyunsaturated alkene; a C<sub>8</sub>-C<sub>18</sub>, branched or unbranched, substituted or unsubstituted mono- or polyunsaturated aralkene; a C<sub>4</sub>-C<sub>20</sub>, branched or unbranched, mono- or polyunsaturated alkenoic acid; a C<sub>1</sub>-C<sub>20</sub> branched or unbranched aliphatic alcohol ester of a C<sub>2</sub>-C<sub>20</sub>, branched or unbranched aliphatic acid, wherein at least one of said aliphatic alcohol and said aliphatic acid contains at least 3 carbon atoms and at least one site of unsaturation; and/or a C<sub>4</sub>-C<sub>20</sub>, branched or unbranched, mono- or polyunsaturated aliphatic alcohol or aliphatic mercaptan.
53. (Currently Amended; Withdrawn) A radiation definable ink, comprising:
- a) the ~~compound~~ material of Claim 21; and
  - b) a solvent in which said compound is soluble.
54. (Original; Withdrawn) The ink of Claim 53, further comprising a source of said photochemically generated species.
55. (Original; Withdrawn) The ink of Claim 54, wherein said source of said photochemically generated species is selected from the group consisting of azides, photogenerated acid sources, photogenerated radical sources and quinones.

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56. (Original; Withdrawn) The ink of Claim 54, wherein said source of said photochemically generated species is an azide, and said group that is reactive with said photochemically generated species comprises said carbon-carbon double bond.
57. (Currently Amended; Withdrawn) The ink of Claim 54, wherein said source of said photochemically generated species comprises ~~is~~ a photogenerated acid source, and said group that is reactive with said photochemically generated species is selected from the group consisting of an epoxide, an oxirane, an aziridine, and an activated carbon-carbon double bond.
58. (Original; Withdrawn) The ink of Claim 54, wherein said source of said photochemically generated species ~~is~~ comprises a photogenerated radical source, and said group that is reactive with said photochemically generated species comprises an acrylate.
59. (Original; Withdrawn) The ink of Claim 53, wherein said ligands contain said photochemically reactive group, and said photochemically reactive group comprises a carbonate and/or a carbamate.
60. (Original; Withdrawn) The ink of Claim 53, wherein said compound is present in said composition in a percentage by weight of from 0.1% to 50%.
61. (Original; Withdrawn) The ink of Claim 53, further comprising one or more additives selected from the group consisting of a tension reducing agent, a surfactant, a thickening agent, and an adhesion promoter.
62. (Original; Withdrawn) The ink of Claim 61, further comprising said adhesion promoter.
63. (Original; Withdrawn) The ink of Claim 62, wherein said binder comprises a C<sub>6</sub>-C<sub>20</sub>, branched or unbranched, mono- or polyunsaturated alkene; a C<sub>8</sub>-C<sub>18</sub>, branched or



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unbranched, substituted or unsubstituted mono- or polyunsaturated aralkene; a C<sub>4</sub>-C<sub>20</sub>, branched or unbranched, mono- or polyunsaturated alkenoic acid; a C<sub>1</sub>-C<sub>20</sub> branched or unbranched aliphatic alcohol ester of a C<sub>2</sub>-C<sub>20</sub>, branched or unbranched aliphatic acid, wherein at least one of said aliphatic alcohol and said aliphatic acid contains at least 3 carbon atoms and at least one site of unsaturation; and/or a C<sub>4</sub>-C<sub>20</sub>, branched or unbranched, mono- or polyunsaturated aliphatic alcohol or aliphatic mercaptan.

64. (Currently Amended; Withdrawn) A method of making the material of Claim 1, comprising the steps of:
- reacting said nanoparticles of said ~~an~~ electronically functional substance with one or more non-ligated compounds corresponding to said ligands having said photoreactive group or said group that is reactive with said photochemically generated species; and
  - isolating and/or purifying said material.
65. (Original; Withdrawn) The method of Claim 64, wherein said nanoparticles of an electronically functional substance contain ligands not having said photoreactive group or said group that is reactive with said photochemically generated species.
66. (Original; Withdrawn) The method of Claim 65, wherein said reacting comprises exchanging said non-ligated compounds for said ligands not having said photoreactive group or said group that is reactive with said photochemically generated species on said nanoparticles.
67. (Original; Withdrawn) The method of Claim 65, wherein said reacting comprises mixing (1) nanoparticles of ~~an~~ said electronically functional substance containing said ligands not having said photoreactive group or said group that is reactive with said photochemically generated species bound thereto and (2) said non-ligated compounds in a solvent for a length of time sufficient to exchange at least a portion of the non-ligated

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compounds for said ligands not having said photoreactive group or said group that is reactive with said photochemically generated species bound thereto.

68. (Original; Withdrawn) The method of Claim 67, wherein said ligands not having said photoreactive group or said group that is reactive with said photochemically generated species bound thereto are present in an excess molar amount with respect to said nanoparticles.
69. (Original; Withdrawn) The method of Claim 65, further comprising mixing a Lewis base with said nanoparticles having bound thereto ligands not containing said group that is reactive with said photochemically generated species and said non-ligated compounds to promote a ligand exchange.
70. (Original; Withdrawn) A method of making the material of Claim 1,
- a) mixing (i) said nanoparticles having bound thereto ligands not containing a group that is reactive with said photochemically generated species with (ii) one or more non-ligated compounds corresponding to said ligands containing a group that is reactive with said photochemically generated species, said non-ligated compounds forming a van der Waals complex or micelle with said ligands bound to said nanoparticles and not containing a group that is reactive with said photochemically generated species; and
  - b) isolating and/or purifying said material.
71. (Original; Withdrawn) The method of Claim 70, wherein said nanoparticles having bound thereto ligands not containing said group that is reactive with said photochemically generated species comprises (i) a nanoparticle core of said electronically functional substance, and (ii) long-chain alkyl groups covalently bound thereto.

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72. (Original; Withdrawn) The method of Claim 70, wherein said non-ligated compounds comprise a long-chain alkyl group covalently bound to said group that is reactive with said photochemically generated species.
73. (Original; Withdrawn) The method of Claim 70, wherein said mixing step is conducted in a polar solvent.
74. (Currently Amended; Withdrawn) A method of making the ~~compound~~ material of Claim 21, comprising the steps of
- a) mixing nanoparticles of the formula  $NP(X^1-R^1)_k$ , where  $k$  is an integer greater than 1 and where  $NP$ ,  $X^1$  and  $R^1$  are as defined in Claim 21, with a molar excess of a compound of the formula  $HX^2-R^2-Y$  or a salt thereof, where  $X^2$ ,  $R^2$  and  $Y$  are as defined in Claim 21, in a reaction mixture; and
  - b) isolating and/or purifying said compound of the formula (1) from said reaction mixture.
75. (Original; Withdrawn) The method of Claim 74, further comprising mixing a Lewis base with said nanoparticles of the formula  $NP(X^1-R^1)_k$  and said compound of the formula  $HX^2-R^2-Y$  to promote a ligand exchange.
76. (Original; Withdrawn) The method of Claim 74, wherein said compound of the formula  $H-X^2-R^2-Y$  or a salt thereof is present in at least 4 times the molar amount of said nanoparticles.
77. (Original; Withdrawn) The method of Claim 74, wherein  $R^1-X^1$  is  $R^1-C(=O)-O-$ , and  $H-X^2-R^2-Y$  is  $H-S-R^2-Y$ .
78. (Currently Amended; Withdrawn) A method of making the material ~~compound~~ of Claim 21, comprising

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- a) either:
- i) mixing nanoparticles of the formula  $(R^1-X^1)_mNP(X^2-R^3-Z)_n$ , where  $R^3$  is any  $R^2$  group,  $Z$  is a leaving group or electrophile, and  $NP$ ,  $m$ ,  $n$ ,  $X^1$ ,  $X^2$ ,  $R^1$  and  $R^2$  are as defined in Claim 21, with a compound of the formula  $H-Y$ ,  $H-Nu-Y$ ,  $H-Nu-R^4-Y$  or a salt of such compounds, where  $Nu$  is a conventional nucleophile and  $R^4$  is  $R^2$  minus  $R^3$ , and  $Y$  is as defined in Claim 21, in a reaction mixture, or
  - ii) mixing nanoparticles of the formula  $(R^1-X^1)_mNP(X^2-R^3-Nu-H)_n$  or a salt thereof with a compound of the formula  $Z-Y$  or  $Z-R^4-Y$  in a reaction mixture, where  $R^1$ ,  $R^3$ ,  $R^4$ ,  $NP$ ,  $m$ ,  $n$ ,  $X^1$ ,  $X^2$ ,  $Nu$ ,  $Y$  and  $Z$  are as defined above; and
- b) isolating and/or purifying said compound of the formula (1) from said reaction mixture.

79. (Original; Withdrawn) The method of Claim 78, wherein said nanoparticles have the formula  $(R^1-X^1)_mNP(X^2-R^3-OH)_n$ ,  $(R^1-X^1)_mNP(X^2-R^3-COOR^5)_n$ ,  $(R^1-X^1)_mNP(X^2-R^3-NZ_2)_n$ , or  $(R^1-X^1)_mNP(X^2-R^3-SH)_n$ ,  $X^2$  is independently a carboxylate, a carboxylic acid,  $-NR^8_2$ ,  $-N^+R^8_3$ , an oxygen atom or sulfur atom,  $R^8$  is H or alkyl, and  $R^5$  is H or an ester protecting group.

80. (Original; Withdrawn) The method of Claim 78, wherein said mixing comprising mixing nanoparticles of the formula  $(R^1-X^1)_mNP(X^2-R^3-Z)_n$ , where  $NP$  consists essentially of a metal and  $X^2$  is a carboxylate, a carboxylic acid or S, with said compound of the formula  $H-Nu-Y$ ,  $H-Nu-R^4-Y$  or a salt thereof, where  $NuH$  is  $-NHR^8$ ,  $OH$  or  $SH$  (except that  $NuH$  is  $OH$  when  $X^2$  is said carboxylate or carboxylic acid) and  $R^8$  is H or alkyl.

81. (Original; Withdrawn) The method of Claim 78, wherein  $NP$  consists essentially of silicon or a silicon-germanium mixture,  $X^2$  is alkylene or O, and said compound of the

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formula H-Y, H-Nu-Y; or H-Nu-R<sup>4</sup>-Y is either H-Nu-Y or H-Nu-R<sup>4</sup>-Y, where H-Nu is COOH, NHR<sup>8</sup> or SH, and R<sup>8</sup> is H or alkyl.

82. (Original; Withdrawn) The method of Claim 78, comprising mixing nanoparticles of the formula (R<sup>1</sup>-X<sup>1</sup>)<sub>m</sub>NP(X<sup>2</sup>-R<sup>3</sup>-Z)<sub>n</sub> with a compound of the formula H-Y or a salt thereof.
83. (Original; Withdrawn) The method of Claim 78, wherein Y is a cyanide, azide, hydroxide or sulfide anion.
84. (Original; Withdrawn) The method of Claim 78, comprising mixing nanoparticles of the formula (R<sup>1</sup>-X<sup>1</sup>)<sub>m</sub>NP(X<sup>2</sup>-R<sup>3</sup>-Nu-H)<sub>n</sub> or a salt thereof with a compound of the formula Z-Y or Z-R<sup>4</sup>-Y.
85. (Original; Withdrawn) The method of Claim 84, wherein Nu comprises a chalcogenide atom, a phenolate anion, an amine, a carboxylate or an aryl group, and said compound of the formula Z-Y or Z-R<sup>4</sup>-Y comprises an aliphatic carboxylic acid anhydride, an allyl halide, or an aliphatic acyl chloride.
86. (Currently Amended; Withdrawn) A method of making the ~~compound~~ material of Claim 21, comprising the steps of
  - a) reacting nanoparticles of the formula (R<sup>1</sup>-X<sup>1</sup>)<sub>m</sub>NP(X<sup>1</sup>-R<sup>3</sup>-(CR=CR'R''))<sub>k</sub>, where k is an integer greater than 1, NP, R<sup>1</sup> and X<sup>1</sup> are as defined in Claim 21, R<sup>3</sup> is R<sup>2</sup> or a precursor thereof, and R, R' and R'' are independently H, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkenyl, C<sub>1</sub>-C<sub>6</sub> alkoxy, mono- or di-C<sub>1</sub>-C<sub>6</sub> alkyl amino, a cyclic amino group, C<sub>6</sub>-C<sub>10</sub> aryl (which may be substituted one or more times with C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkenyl, C<sub>1</sub>-C<sub>6</sub> alkoxy, mono- or di-C<sub>1</sub>-C<sub>6</sub> amino or halogen); -C(=O)O-C<sub>1</sub>-C<sub>6</sub> alkyl or -C(=O)C<sub>1</sub>-C<sub>6</sub> alkyl, with an epoxidizing agent or source of Y<sup>+</sup>, Y<sup>-</sup> or Y<sup>•</sup>; and

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- b) isolating and/or purifying said compound of the formula (1) from said reaction mixture.
87. (Original; Withdrawn) The method of Claim 86, wherein R, R' and R'' are independently H or C<sub>1</sub>-C<sub>6</sub> alkyl.
88. (Original; Withdrawn) The method of Claim 86, wherein said reacting is with said epoxidizing agent.
89. (Original; Withdrawn) The method of Claim 86, wherein said reacting is with said Y<sup>+</sup> source and comprises electrophilically adding Y from Z-Y to the CR=CR'R'' group.
90. (Original; Withdrawn) The method of Claim 86, wherein said reacting is with said Y<sup>-</sup> source and comprises electrophilically adding HY to the CR=CR'R'' group.
91. (Original; Withdrawn) The method of Claim 86, wherein said reacting is with said Y<sup>•</sup> source and comprises radical addition of Y from HY or Y<sub>2</sub> to the CR=CR'R'' group.
92. (Original; Withdrawn) A method of making an electronically functional thin film, comprising the steps of:
- a) irradiating the ink of Claim 38 to form an irradiated composition; and
  - b) curing said irradiated composition to form said electronically functional thin film.
93. (Original; Withdrawn) The method of Claim 92, further comprising, after said irradiating step and before said curing step, the step of developing said irradiated composition to form a patterned thin film.
94. (Original; Withdrawn) The method of Claim 93, wherein said irradiating step comprises selectively irradiating portions of said composition, and said developing step comprises

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removing either irradiated or non-irradiated portions of said layer to form said patterned thin film.

95. (Original; Withdrawn) The method of Claim 94, wherein said selectively irradiating substep comprises (i) positioning at least one of said substrate and a mask such that said portions can be selectively irradiated and said non-irradiated portions cannot be irradiated, and (ii) irradiating said layer with ultraviolet light through said mask.
96. (Currently Amended; Withdrawn) The method of Claim 92, wherein said composition comprises metal, ~~dielectric, phosphor~~ and/or semiconductor nanoparticles having passivation thereon and/or containing ligands not having a (photo)reactive group bound thereto.
97. (Original; Withdrawn) The method of Claim 96, wherein said nanoparticles comprise metal nanoparticles.
98. (Original; Withdrawn) The method of Claim 93, wherein said curing step comprises sintering said developed film to form a patterned electronically functional thin film.
99. (Currently Amended; Withdrawn) The method of Claim ~~93~~<sup>98</sup>, wherein said curing step comprises heating said composition to a temperature of at least about 100 °C for a period of time sufficient to remove substantially all of said ligand(s).
100. (Original; Withdrawn) The method of Claim 99, wherein said curing temperature is at least about 200 °C.
101. (Original; Withdrawn) The method of Claim 100, wherein said curing temperature is at least about 300 °C.

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102. (Original; Withdrawn) The method of Claim 101, wherein said curing temperature is at least about 400 °C.
103. (Original; Withdrawn) The method of Claim 99, further comprising heating said electronically functional thin film to a temperature of at least about 200 °C in the presence of a reducing atmosphere to passivate said electronically functional thin film.
104. (Original; Withdrawn) The method of Claim 103, wherein said heating temperature is at least about 300 °C.
105. (Original; Withdrawn) The method of Claim 92, further comprising depositing said composition on a substrate.
106. (Original; Withdrawn) The method of Claim 105, wherein said depositing comprises inkjetting, spin coating, dip coating, meniscus, extrusion or spray coating a solution, emulsion or suspension of said composition on said substrate.
107. (Original; Withdrawn) The method of Claim 92, wherein said curing step further comprises placing said substrate into a chamber, and evacuating said chamber.
108. (Original; Withdrawn) The method of Claim 107, wherein said curing step further comprises passing an inert and/or reducing gas into said chamber.
109. (Original; Withdrawn) The method of Claim 93, wherein said patterned thin film comprises a two-dimensional array of lines having a width of from 100 nm to 100 µm.
110. (Original; Withdrawn) The method of Claim 109, wherein said lines have an inter-line spacing of from 100 nm to 100 µm.



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111. (Original; Withdrawn) The method of Claim 110, wherein said lines have a length of from 1  $\mu\text{m}$  to 5000  $\mu\text{m}$ .

112. (Original; Withdrawn) The method of Claim 109, wherein said lines have a thickness of from 0.01  $\mu\text{m}$  to 100  $\mu\text{m}$ .

113-123. (Canceled)